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WHEN SHOULD ONE OPERATE FOR "CHRONIC APPENDICITIS"?

A STUDY OF 385 CASES

WALTER C. ALVAREZ, M.D.

ROCHESTER, MINN.

The busy consultant is constantly being called on to help decide whether or not in a given case a certain operation should be performed. Every one knows that this operation works miracles of healing in some cases, but would it do so in the particular one? Often the consultant can only guess and sometimes, of course, being human and fallible, he must guess wrong. From time to time he will hear that some woman who disregarded his advice and went ahead with an operation for which he could see no indications promptly got well, and then he will wonder whether the patient was really cured and if so whether the surgeon who operated was an unusually wise and discerning man or was just lucky. Did he take a long history and from this decide that here was one frail psychopathic woman who could be helped by a laparotomy, or did he operate simply because that was his usual way of handling puzzling cases? Was it his custom to operate on many persons in order to cure a few? Obviously, one can work an occasional miracle in this way; but is not the man who saves forty-nine patients from fruitless operations while failing to help one a much better physician and public servant than is he who operates fruitlessly on forty-nine in order to cure one?

Unfortunately, today, for lack of statistical information, the consultant must base many of his decisions on "hunches" or on a mental summing up of vague pros and cons. How much better and more exact our science would be if we physicians could say to a particular patient "Statistics show that in a case like yours there is only one chance in a hundred that an appendectomy would help. If you are desperate enough to take such long odds, or if by temperament you are a gambler, you can choose to be operated on. I cannot advise you to take such chances because always I must tell my patients what I believe is the wisest and safest course and the one most likely to lead to renewed health." If, then, with the unfavorable odds before him, an individual should choose to gamble and should win, he couldn't logically heap abuse on the sensible clinician who cautioned him and heap praise on the highly optimistic surgeon who operated; he could only congratulate himself on being lucky.

METHOD OF STUDY

Following this line of thought, I several years ago opened a note book in which I gathered data to help me in deciding when and when not to recommend an interval appendectomy. Whenever I saw a patient with a scar in the right lower quadrant of the abdomen I asked why the operation was done, what were the symptoms complained of, were there any acute attacks of appendicitis, and what was the result obtained?

In all, I obtained information from 385 patients, seen consecutively and all operated on, not at this clinic, from three to thirty years ago. There were about equal numbers of men and women.[1] Toward the end of the paper I will comment on a few cases in which I learned much by my own mistakes. What usually happened was that I failed to elicit or to interpret properly the history of one or more mild or atypical attacks of appendicitis, and as a result some one else had to order the operation and cure the patient.

WHAT DETERMINES SUCCESS OR FAILURE

I had not accumulated many records before it became apparent what the important point in the patient's history was. Evidently there was one simple question the answer to which could immediately have told the surgeon whether or not he would be justified in operating for "chronic appendicitis." This question was: Did the patient ever have one or more attacks of abdominal pain around the navel or in the right lower quadrant, pain severe enough to put him to bed, to keep him awake much of the night and to cause the attending physician to diagnose or greatly suspect the presence of acute appendicitis? In most of the cases in which, after one or more such attacks, a young man or woman suffered with indigestion, nausea, loss of appetite, abdominal discomfort, toxic feelings, occasional cramps and a loss of energy and joy of life, appendectomy worked a decided cure. On the other hand, in almost every case in which there was no history suggesting a previous acute attack of appendicitis, the operation was fruitless.

I know that this has been the experience of most able clinicians and surgeons, but I think any one who will look over the brief records given here of patients operated on in these United States will agree with me that there is still great need for showing the medical profession the almost complete hopelessness of performing appendectomy in cases in which no history can be obtained of acute attacks of abdominal pain. There is great need also for showing physicians that appendectomy can no longer be looked to as a cure for neuroses, fatigue states, "mucous colitis," constipation, diarrhea, migraine, duodenal ulcer, cholecystitis or regurgitation. Naturally, in the past there was need for investigation along these lines; but enough trials have been made and enough failures recorded so that further research would seem now to be unnecessary.

From the Division of Medicine, the Mayo Clinic.

1. Unfortunately, at the beginning of this study I got tired of keeping notes of all those typical cases in which, in youth, there was an acute attack, a quick operation and a complete cure, or the number of these cases listed would have been much larger.

PART I. CASES IN WHICH THERE WAS NO HISTORY OF ACUTE APPENDICITIS

Reasons for Performing the Operation and the Results Obtained.—There were 255 patients who could not remember ever having had an attack suggesting acute appendicitis. In table 1 I have listed the many conditions which physicians hoped that appendectomy would cure, or the best guess as to the condition then existing that can now be made.

A study of this table brought me several surprises. I had assumed that in this country the main reason for performing an interval appendectomy is pain and soreness in the right lower quadrant of the abdomen with some indigestion. Actually, in the group of 255 patients there were only twenty-five who were operated on because of this syndrome. Twenty were operated on for a roentgenologic diagnosis of appendicitis, which apparently was incorrect in every instance because none of the patients were helped by the removal of the organ. These observations support the opinion of some of the ablest roentgenologists in the country today who do not ever attempt, from their films, to make the diagnosis of a diseased appendix.

TABLE 1.—*Diseases Which Appendectomy Was Expected to Help; Data from 255 Patients Who Gave No History of Acute Appendicitis* *

Diseases	No. of Cases
Neurosis and nervousness	39
Constitutional inadequacy	32
Pseudo-appendicitis	25
Duodenal ulcer	24
Migraine and migraine equivalent	24
Psychopathic troubles	22
X-ray diagnosis of appendicitis	20
Functional and nervous diarrhea	17
Sensitive colon or "Mucous colitis"	15
Nervous regurgitation	15
Cholecystitis	14
Spondylitis, fibrositis and myositis	13
Sore liver and pseudocholecystitis	12
Pseudo-ulcer, gastritis (?), heartburn	12
Vague indigestion or abdominal discomfort	11
Food sensitiveness and allergy	10
Flatulence, and bloating and belching	10
Nausea	7
Constipation	7
Renal colic	6
Toxic feelings	4
Polyglandular dysfunction	4
Pyelitis	3
Low grade fever (?)	3
Patient insisted on it	3
Cerebral thrombosis (slight)	2
Acute indigestion from overeating	2
Jaundice	1
Cataplexy	1
A stitch in the side	1
Epilepsy-like spells	1
Uterine leiomyomas	1
Tuberculosis of the cecum	1
Carcinoma of the ascending colon	1
Constant headache	1

* In some instances one case has been listed under several headings, as when a psychopathic, constitutionally inadequate girl suffered with a sensitive colon, migraine and constipation.

The most common reason given for the performance of the operation was that the patient and the surgeon hoped that it would bring quick relief from the distresses of constitutional inadequacy, a fatigue state, a nervous breakdown or a psychopathic makeup. At least two of the patients were occasionally insane. No one of the ninety-three patients in this group obtained permanent relief.

Curiously, the next most frequent reason given for having submitted to an interval appendectomy was that the attending physician hoped thereby to cure that group of symptoms which suggested or indicated the presence of a peptic ulcer. There were thirty-six cases of this type, and in twenty-four a duodenal ulcer was demonstrated roentgenologically either before the operation or after it. In a number of cases, after the surgeon was told that an ulcer was present he went ahead and removed the appendix through a McBurney incision. In some instances he told the patient that he was acting on the old theory that chronic infection in the appendix can start an ulcer going and can keep it active. In a few other cases the operator was frank enough to admit that he would rather try the effect of appendectomy first because his mortality rate for gastro-enterostomy was a bit high. One of the patients, an opinionated business man, when told that he had an ulcer, refused to diet and ordered his family doctor to operate on him. Rather than argue with him, the physician wisely did only what he felt capable of doing.

The failure to effect a cure in any of the twenty-four cases of ulcer should, I think, convince every one that appendectomy can no longer be regarded as a treatment for ulcer. As one might have expected, following the rest in bed and the usual short vacation from business, several patients obtained a remission; but others failed to get any such relief, and a few were worse. Only one of the twelve patients operated on for pseudo-ulcer and heartburn was rewarded with lasting relief.

As Barber and Mayo [2] have shown, there is a group of patients with a syndrome suggesting cholecystitis or duodenal ulcer who can be cured by appendectomy; but, as they emphasize, this group must be chosen with great care and after much study. The patient's history must suggest strongly that he has organic disease of the digestive tract, and finally, when the surgeon operates, he must explore the abdomen to rule out the presence of ulcer and cholecystitis.

There were twenty-four patients operated on for migraine or a migraine equivalent, seventeen for nervous or functional diarrhea, and fifteen for a sensitive colon or the so-called mucous or spastic colitis. I would like to emphasize the fact that none received any benefit. Fifteen other patients were operated on with the hope of curing the type of regurgitation which, in nervous women, comes immediately after meals, but none obtained relief. I have never seen an operation of any kind cure these people.

There were fourteen patients with gallstones and twelve more with a sore liver and a cholecystitis-like syndrome who had the appendix out, without any relief. Apparently we physicians should discard the old theory that infection in the appendix, draining into the gallbladder region, will keep up a cholecystitis. There were thirteen patients whose pain in the right lower quadrant of the abdomen appeared to be due to a subacute spondylitis with the related fibrositis, neuritis and myositis. There were ten whose trouble proved, on further study, to have been due to specific food sensitiveness, and ten who were flatulent. Unfortunately, six patients with renal colic had the appendix out a little too hurriedly before the stone in the ureter was discovered. As every one knows, the differential diagnosis in such cases is sometimes difficult. Interestingly,

2. Barber, K. W., and Mayo, C. W.: Appendectomy for the Relief of Chronic Abdominal Pain, Proc. Staff Meet., Mayo Clin. **9**: 103-104 (Feb. 14) 1934.

in seven cases the attempt to cure constipation by appendectomy resulted in failure. Actually, in several cases severe constipation appeared to result from the operation. In a large number of the cases the history suggested that the main trouble at the time of operation was that the patient was worn out with overwork and prolonged strain. As every one knows, fatigue can give rise to puzzling digestive syndromes.

Favorable Results and the Odds for Success or Failure.—Most astonishing is the fact that in the 255 cases there were only two in which the operation appeared to work a complete cure. One patient had heartburn. Why he got well I cannot say because another man with heartburn was worse for the operation. The second patient, a youth of 19, suffered with malaise, a toxic feeling, fatigue, anorexia, constipation, and occasional abdominal cramps. He could not remember a definite acute attack but he was cured by appendectomy. These symptoms, when they appear in a previously healthy youth or girl, should always suggest the presence of a smoldering appendicitis, and often they will justify an abdominal exploration and appendectomy.

My data indicate, then, that a patient, and especially an adult, who submits to appendectomy when he has never had an acute attack has perhaps one chance in 100 of getting a permanently satisfactory result. Unfortunately he has about the same chance of dying from the operation. Since there were four patients who had partial relief and four who lost their symptoms for several years, one can say that there are another three chances in 100 of getting some relief.

Against this 4 per cent chance of getting some benefit one must place a 24 per cent chance that the patient will be decidedly worse, a probability that will be discussed in the next paragraph.

The Probability That the Patient Will be Worse.—Unfortunately today most patients and physicians seem to look on an interval appendectomy as something that carries a good chance of working a cure and no chance of doing any harm; in other words, the patient is supposed to have everything to gain and nothing to lose. Would to God that this were true!

Actually, sixty of the 255 patients, or 24 per cent, were decidedly the worse for the operation. Some who could stand their distress and still keep at work before the laparotomy could never work afterward. Twelve said they "hadn't had a well day since," seven were thrown into a bad nervous breakdown, several were unable to sleep well afterward, several developed a worse pain or a pain in a new region, and one became obsessed with the fear of adhesions. In the case of two hypo-ovarian women, menstruation almost ceased after the operation and several others lost all sexual feeling. One was left with a rebellious pyelitis, one with chronic diarrhea and another with an almost intractable constipation. It is sad to think that in four of these cases a lifetime of invalidism followed a rush to the operating room to get relief from a little abdominal discomfort.

Much worth noting also is the fact that thirty-four patients were made so much worse by the first operation that in an effort to improve conditions from one to five more unprofitable laparotomies were soon performed.

In sixteen cases a stoneless gallbladder was removed at the time of the appendectomy because, on seeing that the appendix did not look bad, the surgeon hoped that an extra operation would add to the chances of the patient's getting well. It didn't.

One frail, constitutionally inadequate girl with pain around the cecum had four successive laparotomies for (1) appendectomy, (2) the breaking up of adhesions, (3) ovariectomy, and (4) exploration, all before she was 20! A psychopathic young woman whose troubles followed worry over an impending divorce had, within three years, an appendectomy and three exploratory laparotomies. In spite of all this the final decree immediately restored her to health. Unfortunately, she lost this health for a while again when she worried over a love affair with another man! A frail girl with hysterical regurgitation submitted within the course of a few years first to gastro-enterostomy and then in succession to appendectomy, cholecystectomy, the taking down of the gastro-enterostomy, and an abdominal exploration. Another regurgitating girl had in succession appendectomy, cholecystectomy, gastro-enterostomy and exploratory laparotomy. Another had this series plus an operation for intestinal obstruction and another, whose appendix was removed with the hope of helping a pyelitis of pregnancy, went on to have a trachelorrhaphy, gastroduodenostomy, cholecystectomy, nephropexy and an exploration for adhesions. In all, sixty-eight secondary operations had been performed on thirty-four patients by the time I saw them, and I am sure that some of the series were not yet complete. A few of these operations, when they were really indicated for the removal of gallstones or an ulcer overlooked at the time of the appendectomy, brought some relief, but the majority, which were done in desperation, did not help.

It will be seen, then, that in this series in which the patient never had an attack of acute appendicitis the chances of losing heavily as compared with the chances of getting cured were thirty to one. The chances of losing heavily as compared with the chances of getting some help were six to one. These certainly are not odds with which to encourage a nervous and worrisome patient.

The Dangers of Rushing Patients to the Operating Room.—The great dangers that a patient runs when he allows himself to be rushed to the operating room with only a little abdominal discomfort were well illustrated during this study. Several times a little examination or history taking or the making of a "scout film" or a urinalysis would have revealed the fact that the patient was suffering with a stone in the gallbladder or ureter, or with pyelitis, multiple sclerosis, tuberculosis of the cecum or an ordinary irritable colon. The real trouble of two patients was that they had suffered a slight stroke.

A college girl was rushed to the operating table so fast that she hadn't a chance to impress the surgeon with the fact that she had just been on the type of "walnut fudge bust" which always gave her a violent allergic stomach ache. Another young woman couldn't convince the surgeon that she always got an alarming stomach ache when she ate onions. One patient had an acute duodenal ulcer which was not helped by the appendectomy; another had a Ménière syndrome with nausea and vomiting due to active but then unrecognized syphilis; another had just had a violent argument with his wife; several school teachers were worn out with fatigue at the end of the school term, and one girl had simply vomited her dinner. In three cases a girl

was thought to have a fever because she had a temperature of 99.5 F. When the appendectomy did no good it was finally decided that the temperature was within the limits of normal.

One of the most interesting of the stories told by the persons who had been rushed to the operating room was that of a young, highly neurotic Jewish woman who always, under any excitement, gets a bad attack of "mucous colitis." Naturally, she had one of the most violent spells of her career a few hours before she was to be married, and as a result she was rushed to the operating room and made to spend her wedding night and her honeymoon alone in a hospital cot. Because the attacks continued after the operation, one must doubt whether she ever had appendicitis.

The Need for Exploring the Abdomen.—In almost all of the 255 cases the scar of the appendectomy was only 2 or 3 inches long, and evidently no abdominal exploration had been done. In one case the operator was inordinately proud because the scar he made was only 1 inch long. He was not so proud later when he learned from a colleague that he had missed a carcinoma of the ascending colon. There were many such cases in which a little exploration would have revealed the really important gallstones or duodenal ulcer and would have saved the patient a second trip to the operating room. The data show clearly that in perhaps ninety-nine out of a hundred cases in which the appendix is removed during an interval and without careful preliminary study the operation, if done at all, should be listed and looked on and proposed to the patient as an exploratory laparotomy. As such it would have some value; as an appendectomy it rarely has any value.

The Fault is Not Always on the Part of the Medical Adviser.—Obviously some mistakes were made, and some of these were made because of the lack of statistical information such as I am now trying to secure. How is a physician to know that appendectomy is useless as a cure for migraine, duodenal ulcer or "mucous colitis" unless he has at hand the recorded experience of many men who have gone before him? Some mistakes were made because of hurry, some doubtless because the physician was tired and worn with overwork, and some because he didn't have good facilities for diagnostic work. Many were made because the physician so desired to help some sweet, frail, ailing girl that he let his heart override his better judgment. I know that in the past some of my own mistakes were made because I yielded to a girl's pleading to go the limit to help her and make her into a normal healthy person again: one able to work and to marry. Perhaps a third of the patients admitted that they had been too willing to be operated on, too anxious to be cured in a hurry, and too unwilling to face months of resting and of grueling efforts at self discipline.

At least four patients insisted on having the operation done after having been warned against it. A stout, red faced saloon keeper was so angry at me for hinting that his troubles were due to overeating and alcoholism that he went home and ordered his surgeon to operate and show up my ignorance. To his credit be it recorded here that when he became no better he returned meekly for a reduction diet. A nervous and strong willed woman, badly upset over the financial losses of 1929, was much annoyed when her physician refused to countenance an appendectomy. She got some one to remove the organ, and when the strain of this operation drove her deeper into a nervous breakdown she next insisted that her normally functioning gallbladder be removed. Another woman of the same type had a useless appendectomy, nephropexy and finally cholecystectomy, all against the advice of her physicians.

A man with a vague abdominal discomfort and toxic feelings talked me into letting him have an appendectomy. He wanted it because his wife, with a syndrome similar to his, had been relieved by the removal of the appendix. In spite of this favorable psychic preparation for the operation there was improvement for only four months. An interesting case was that of the man who woke one morning with pain around his navel. After his physician had studied him for ten days in the hospital and had decided that there was nothing wrong with him, his nurse took him in hand and talked him into an appendectomy!

The most remarkable story of all was told by a woman who gave as the only reason for her appendectomy the fact that on arriving in Los Angeles one day she found a big convention in full swing and all the hotels full. The only place in which she could find a bed was a hospital, so she took it and had her appendix out. She had always wanted to have it done in a routine manner some time, like a tonsillectomy, so why not then?

The Length of the Period of Relief After an Operation That Did Not Cure.—As every one knows, many a patient with either a functional disturbance or disease in some organ will get well for weeks or months after an operation which was not indicated and which did not remove the cause of the trouble. To learn something more definite about this phenomenon, I kept notes as I went along. Actually I was surprised to find that approximately three out of four patients could not remember having experienced even temporary improvement after the operation. When there was improvement it generally lasted less than three months, but occasionally it lasted for periods up to three years and rarely it lasted for several years. It was remarkable to see that sometimes, after years of relief, the same old soreness and pain in the right lower quadrant could return.

For a while I tried to see why some persons obtained temporary relief and others did not, but I did not learn anything. Some patients thought the relief was due to rest in the hospital and later at home, because the symptoms returned soon after the return to work. The type of anesthetic used was not correlated with the duration of relief. Curiously, some of the persons who had a series of four fruitless operations had no period of relief after any of them, while other patients with such operations had short periods of relief after some, while not after others.

Psychic Effects.—Many physicians have an idea that if a neurotic woman should be operated on and told that her disease had been found and entirely removed she would have to get well, but my data show that this type of psychotherapy was uniformly unsuccessful. Usually the patient was complaining again of her pain before she left the hospital, and when she did feel better for a time she did not stay well.

In one case of this type I advised the appendectomy, first, because the girl's illness had followed two suspicious attacks of abdominal pain, and, second, because there was a bad psychologic situation present which I felt had to be cleared up. With the best of intentions, one physician had told her that she would die if she

did not have the operation and another had told her that her heart would stop on the table if she did. While trying to steer a course between these two inviting contingencies the girl went to pieces nervously and remained a wreck for several years. The operation brought her so much better health that she promptly went back to work, but since some abdominal pain returned in a few weeks I doubt whether she ever had appendicitis.

PART II. CASES IN WHICH THERE WAS A HISTORY OF ONE OR MORE ATTACKS OF WHAT LOOKED LIKE ACUTE APPENDICITIS

There are a number of interesting facts worth emphasizing about the 130 cases in which appendectomy was done for what looked like acute or recurrent appendicitis. Table 2 shows that, taking the group as a whole, 67 per cent were apparently cured, 25 per cent were helped or relieved for a few years, while 5 per cent felt they were no better and 2 per cent were worse.

The 67 per cent of cures in this group of persons who had one or more acute attacks can be compared now with the 0.8 per cent of cures in the group of patients without acute attacks, and the 2 per cent of bad results in the group with acute attacks can be compared with the 24 per cent of bad results in the group without acute attacks. Actually, the percentage of cures in the group with attacks would probably have been larger if it had not been that I was studying patients in a physician's office.

Apparently I was right in doubting the correctness of the diagnosis of acute appendicitis that had been made in many of the twenty-five cases which I listed in the "questionable" column in table 2, because in that group only 48 per cent were cured, 24 per cent were better, 20 per cent were no better, and 8 per cent were worse.

In a number of instances it was impossible to determine whether the operation was really needed or helpful because the patient was well before having the little digestive upset or stomach ache or stitch in the side which led to the performance of a hurried operation, and the patient was just as well afterward.

The Harmlessness of Adhesions.—Very interesting is the fact that adhesions did not seem to bother 73 per cent of the twenty-six patients whose abdomen was drained following rupture of the appendix. Another 19 per cent had some indigestion after the operation, and only one man appeared to be seriously hampered in later life. In his case an abscess broke through into the rectum, and years later the scar seemed to be causing distress. One woman had to have a pelvic abscess drained a year after the appendicitis; another woman who survived peritonitis had one or two mild attacks of intestinal obstruction and then was well, one man had to have a section of bowel resected because of an attack of obstruction, and a woman had to have a hysterectomy, perhaps because of the old peritonitis. Two other patients had some pain or soreness years after the operation. One continued to have trouble perhaps because he was mildly insane. Another suffered with flatulence throughout life but it was impossible to determine what relation this had to the old peritonitis. In one remarkable case a man survived rupture of the appendix with peritonitis to die long after with a carcinoma of the stomach. At necropsy the intestine was found to be so matted together that no peritoneal cavity could be found—and yet he had been well for twenty years!

Instructive is the fact that only two of the twenty-six patients with an abdomen full of adhesions had to be operated on because of them. Both had one attack of obstruction within a year or two after the appendectomy, and after resection of the constricted segment they were well. In my series of 385 cases, the fifteen operations for nonobstructing "adhesions" were performed on patients in the group who had had a clean "interval operation" which should not have caused many adhesions. Perhaps, as a famous clinician used to say, "adhesions are the refuge of the diagnostically destitute."

Some Instructive Cases in Which the Diagnosis of Chronic Appendicitis Should Have Been Made Earlier Than It Was.—In an occasional case, the conservative clinician will go wrong because he will fail to elicit the history of an attack of acute appendicitis, or he will fail to recognize the true nature of some vomiting spells or stomach aches that the patient describes.

TABLE 2.—*Data from 130 Patients Who Had Had Attacks of Definite or Questionable Acute Appendicitis*

	Definite Attacks		Ruptured and Drained		Questionable Attacks			
	Number	Per Cent	Number	Per Cent	Number	Per Cent	Total	Per Cent
Patients	79	..	26	..	25	..	130	..
Cured	56	71	19	73	12	48	87	67
Improved	14	18	5	19	5	20	24	18
Well for a time	7	9	1	4	1	4	9	7
No change	2	2	..	..	5	20	7	5
Worse	..	..	1	4	2	8	3	2

For instance, a woman came to the clinic in 1935 with a vague story of indigestion coming soon after eating, gas under the heart, nausea, and induced vomiting. Because this story was indefinite, the roentgenologic studies were negative and the woman was neurotic and drinking heavily, a diagnosis was made of functional indigestion. Shortly after this she suffered an acute attack of abdominal pain, and appendectomy then cured her. Later, when I saw her in another illness, careful questioning brought to her mind the fact that some six months before the operation she had been in bed two days with abdominal pain and a rigid lower abdomen.

In another case I failed to realize the significance of some acute digestive upsets suffered by a young man on a vacation trip through the mountains. Fortunately, a surgeon later operated and cured the boy's indigestion and feelings of toxicity, weakness and fatigue.

In still another curious case the complaint was of heartburn, water brash, attacks of diarrhea and sometimes flatulence, several spells of soreness over the cecum, and one attack of momentary excruciating pain in the right lower quadrant promptly relieved by the gurgle of some gas which apparently passed through the ileocecal sphincter. Some of the consultants advised appendectomy, while others felt the indications were too indefinite. The day after the man's return home he had what appeared to be an attack of acute appendicitis, and appendectomy left him so much better that one has to assume that his troubles were due mainly to appendicitis. The puzzling feature is that he returned

recently with some of the old symptoms and the old soreness at McBurney's point.

The most remarkable case in this series was that of an executive of 55 who had always had perfect health and great energy. Then, after a painful accident to his hand he lost his sense of well-being and his "drive" and suffered some indigestion and abdominal discomfort. Two roentgenologic examinations showed prolonged stagnation of the barium sulfate in the last 2 feet of ileum. The man's wife finally remembered that thirty years before he had had a couple of painful attacks of what was diagnosed as acute appendicitis. Shortly after this information was secured the man had an acute attack of appendicitis, and an appendectomy restored his health. The chronically inflamed appendix apparently caused such spasm in the last segment of ileum that the food was held back.

COMMENT

I admit that the group studied is not ideal statistically in that the individuals were found in a physician's office and therefore should belong predominantly in the fraction of unfortunates who failed to be cured. Although there must be some truth in this assumption, I feel sure that it cannot account for the high percentage of poor results reported by the patients who never had acute appendicitis. If such a strong selective force had been at work on the whole group, how could 92 per cent of the patients who had had acute appendicitis be reporting a cure or improvement? Actually, a large percentage of the patients I saw came to the clinic for help with a new problem, one not at all related to the old appendicitis.

But if one objects to this method of obtaining information, what other method can one use? One can use the follow-up method, but for several reasons this is not entirely satisfactory. That something is wrong with it can easily be seen from Shelley's [3] frank statement that whereas 89 per cent of a large series of patients who had microscopic signs of disease in the appendix got well after removal of the organ, 80 per cent of those whose appendix showed no signs of disease also reported themselves as cured.

SUMMARY

On studying the histories of 385 patients who, some years before, in their home cities, had submitted to appendectomy, I found that only two, or 0.8 per cent, of the 255 who had never had an acute attack of appendicitis were cured, while eighty-seven, or 67 per cent of the 130 who had had at least one acute attack of abdominal pain, were cured. If one takes into account also those cases in which some help was obtained, the respective percentages of good plus fair results in the two groups become 4 and 92.

In the group of patients who did not have an acute attack, the commonest reason for operating was the type of abdominal discomfort which goes often with constitutional inadequacy, chronic fatigue, a nervous breakdown or a psychopathic makeup. Other common reasons for operating were that the patient had a duodenal ulcer or ulcer-like symptoms, migraine, functional diarrhea, a sensitive colon, nervous regurgitation, gallbladder disease, a sore liver, spondylitis, food sensitiveness, renal colic or constipation. Only one of the patients with these troubles was helped permanently by the operation.

Twenty-four per cent of the patients were decidedly the worse for the operation. In thirty-four cases, failure of the appendectomy to help led to the performance of sixty-eight more laparotomies, most of which did not bring good results.

All of the patients who were rushed to the operating room in the absence of typical symptoms of acute appendicitis failed to get good results. Apparently it is not possible to diagnose chronic appendicitis roentgenologically, because in every one of the twenty cases in which this was attempted the operation brought no relief.

Seventy-three per cent of the patients who had peritonitis after rupture of the appendix had no further trouble, in spite of the probable presence of dense adhesions. In the total series of 385 cases the fifteen operations (all fruitless) for nonobstructing adhesions were all performed on patients who had had a clean interval appendectomy. Only two operations for adhesions were performed on the twenty-six persons who had had generalized peritonitis and each was made necessary by an attack of intestinal obstruction.

Only one in four of the patients who were not cured by appendectomy experienced temporary improvement, and then the period of relief was usually less than three months. The theory that one can cure the abdominal distresses of a neurotic or psychopathic patient by first assuring her that all the symptoms arise in one organ and then removing that organ is not borne out by the experience of the patients interviewed. The results of the procedure were uniformly bad.

There appear from this investigation to be only two definite indications for an interval appendectomy. One is that the patient has had one or more attacks of what looked like acute appendicitis, followed by indigestion, loss of energy, toxic feelings, a sore cecum and perhaps abdominal cramps; another indication is the appearance of these symptoms in a youth or a girl who has previously been well. Then the appendectomy sometimes works a cure. Occasionally an ulcer-like syndrome is due to chronic appendicitis.

It was noted that a large percentage of the patients who were cured by appendectomy had the operation before they were 25, while a large percentage of those who had poor results from the operation had it when they were over 25.

It would seem that true chronic appendicitis, instead of being regarded as the commonest intra-abdominal disease, should be thought of as one of the rarest.

3. Shelley, H. J.: Chronic Appendicitis: Is It a Clinical Entity? Arch. Surg. **37**: 17-45 (July) 1938.

Osler's Three Ideals.—I have three personal ideals. One, to do the day's work well and not to bother about the morrow. It has been urged that this is not a satisfactory ideal. It is; and there is not one which the student can carry into practice with greater effect. To it, more than anything else, I owe whatever success I have had, to this power of sitting down to the day's work and trying to do it well to the best of one's ability and letting the future take care of itself. The second ideal has been to act the Golden Rule, as far as in me lay, toward my professional brethren and toward the patients committed to my care. And the third has been to cultivate such measure of equanimity as would enable me to bear success with humility, the affection of my friends without pride, and to be ready when the day of sorrow and grief came to meet it with courage befitting a man. I have made mistakes but they have been mistakes of the head, not of the heart.—Quotation by S. A. MacDonald from Osler's farewell address to America, published in *University of Western Ontario Medical Journal* **10**:1 (Nov.) 1939.

APPENDICITIS

AN ANALYSIS OF 1,153 CASES AT THE CINCINNATI GENERAL HOSPITAL

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For the present knowledge of appendicitis and the important concepts of its surgical treatment physicians are indebted to Fitz, Murphy, McBurney and others, who, during the last fourteen years of the nineteenth century, succeeded in acquainting the medical profession with the clinical picture of the disease. If one remembers that, only a short while before, inflammation of the right lower quadrant had been a little understood and frequently fatal disease, the brilliant results obtained by these men must seem remarkable. How little has been added to their concepts becomes apparent on reviewing their articles and painfully so when the results of modern therapy are compared with those obtained by these pioneers fifty years ago.

It was not until 1925 that, through the reports of the United States Bureau of Census and of some of the larger life insurance companies, physicians became aware that the mortality from appendicitis was rising. Bower [1] found that the death rate per hundred thousand of population was 22.3 per cent higher in 1923 than it had been ten years before, and he came to the conclusion that the prehospital management of the patient was in a large part responsible for the excessive mortality. This opinion was supported and confirmed by the investigations of many others. Nearly every one has recognized that the excessively long period of time between the onset of the disease and the operation and the unfortunate habit of taking cathartics for abdominal pain have been important factors in increasing the mortality from appendicitis. Reid [2] has felt that, in addition to these factors, mistakes of surgical judgment and operative procedure have often been responsible for poor results, an opinion sustained by the improvement in mortality at the Cincinnati General Hospital after the McBurney incision became routine practice. It is our belief that such an unfortunate situation has occurred, at least partly, because of the failure of the medical profession to recognize its responsibility in the matter of educating the public in regard to the dangers of and the management of abdominal pain, and also from the attitude of some physicians who still insist on delaying operation after a diagnosis of acute appendicitis is made, in the hope that the process will subside. It was surprising to find that twelve patients in our series reported that cathartics had been prescribed by the attending physician.

In some places, notably Philadelphia, efforts were made to improve the situation, and it is not unwise now to review the Philadelphia campaign and its results, even though they have long since become generally known. Stickers describing the course to be followed in the event of abdominal pain and placards advising the avoidance of cathartics in such a situation were publicly displayed in drug stores and elsewhere. A great deal of additional propaganda was used to acquaint the public as well as possible with proper procedure when appendicitis was suspected. The effectiveness of such a campaign is indicated by the fact that in Philadelphia the mortality decreased 19.43 per cent in 1930 as compared with 1928 and 1929.[3] During the same period the incidence of perforation decreased 17.04 per cent and the delay period between the onset and the operation was decreased 11.81 hours.

In spite of the apparent general increase in appendicitis mortality, some reason for optimism is to be found in the fact that while the deaths per unit of population are increasing, the mortality among patients treated surgically seems to be decreasing. This is well demonstrated by Schullinger's [4] cases from the Presbyterian Hospital in New York. Walker [5] also found this decrease in mortality based on operations and noted that deaths due to peritonitis without specific cause have shown the same trend. It may possibly be true that the apparent increase in the deaths from appendicitis is in part attributable to better medical diagnosis or to more careful statistical work.

We have been greatly concerned about the large number of deaths from appendicitis occurring in Cincinnati. At the time of the publication of a paper by Reid, Poer and Merrell [6] the appendicitis death rate in this city was the highest of any large city in the United States. Since then an intensive educational campaign has been carried on, both in the medical profession and among the people, under the joint direction of the Academy of Medicine of Cincinnati and the Public Health Federation. This undertaking has resulted in the lowering of the resident death rate from a yearly average of 17.3 per hundred thousand of population during the three year period 1929-1931 [7] to 11.3 in 1937, and it will be interesting to compare the statistics of the present series with those of the previous nineteen years, which were reviewed in the paper by Reid and his associates.

ANALYSIS OF CASES

The variety and number of terms used in the classification of appendicitis, especially when the inflammation has extended beyond the appendix itself, has been quite confusing and, we believe, somewhat inaccurate. The use of such nomenclature as spreading peritonitis, diffusing peritonitis, generalized peritonitis and local peritonitis seems unjustified, if we consider that it is difficult to be certain of the extent of the peritonitis except by exploration at operation, a procedure which is not justified in such a situation. Therefore, in consideration of those cases in which the process has extended outside the appendix, we shall employ the terms abscess and peritonitis. A few cases of early rupture in which peritonitis had not developed are included under the term acute unruptured.

Classification.—We have carefully reviewed the case records of 1,153 patients treated at the Cincinnati General Hospital during the years 1934 to 1938 inclusive (table 1). Of these patients 921 had acute and 232 chronic or interval appendicitis. Of the 338 with acute involvement in which the process had extended beyond the confines of the appendix, 209 had peritonitis and 129

From the Department of Surgery of the University of Cincinnati College of Medicine, and the Cincinnati General Hospital.

1. Bower, J. O.: Acute Appendicitis, J. A. M. A. **96**: 1461 (May 2) 1931.

2. Reid, M. R.: Some Remarks on the Operative Procedures for Appendicitis, Surg., Gynec. & Obst. **59**: 529 (Sept.) 1934.

3. Bower, J. O.: The Mortality of Acute Appendicitis, J. A. M. A. **99**: 1765 (Nov. 19) 1932.

4. Schullinger, R. N.: Acute Appendicitis and Associated Lesions, Arch. Surg. **32**: 65 (Jan.) 1936.

5. Walker, I. J.: Why the Increasing Mortality in Appendicitis, Am. J. Surg. **25**: 228 (Aug.) 1934.

6. Reid, M. R.; Poer, D. H., and Merrell, Paul: A Statistical Study of 2,921 Cases of Appendicitis, J. A. M. A. **106**: 665 (Feb. 29) 1936.

7. During this period the crude death rate from appendicitis, which included nonresidents, was over 30 per hundred thousand of population.

had local abscess formation. This division differs considerably from that of the preceding nineteen years, when of 865 patients with perforated appendicitis only 289 had peritonitis while 576 had formed abscesses. In other respects the two periods compared very closely in regard to classification. Although there has been some decrease in the number of acute cases with perforation, the slight improvement represented by the figure 36.7 per cent in the period 1934-1938 as compared with 42.51 per cent for the preceding nineteen years is at first glance hardly encouraging. However, it should be emphasized that all cases reported in this series and the former one involved charity patients who, in general health and education, were far below the average of private patients. Their response to a general educational program could scarcely be expected to be as good as that of private patients.

TABLE 1.—*Classification*

Pathologic Condition	1934-1938 Inclusive		1915-1933 Inclusive	
	Number	Per Cent	Number	Per Cent
Acute unruptured	583	50.56	1,170	41.1
Acute with perforation	338	29.31 (36.7% of all acute cases)	865	30.4 (42.51% of all acute cases)
Peritonitis	209		289	
Abscess	129		576	
Chronic and interval	232	20.12	810	28.5
Total	1,153		2,845	

TABLE 2.—*Average Elapsed Time Between Onset of Acute Attack and Admission to Hospital*

Pathologic Condition	1934-1938 Inclusive (Elapsed Time in Hours)	1915-1933 Inclusive (Elapsed Time in Hours)
Acute unruptured	33.1	44.0
Acute with perforation	100.0	
Peritonitis	64.9	80.64
Abscess	145.9	129 6

Age.—The mean age of all the patients included in this series was 25.1 years. Of those with unruptured acute appendicitis the mean age was 20.3 years as compared with 30.8 years for those in whom perforation had taken place.

The total of 423 cases in the second decade of life was the greatest number occurring in any age group. The greatest number of ruptured cases (ninety-six) also occurred in this period. The third decade had the second highest incidence (320), and the number of cases gradually diminished in the older age group.

Sex.—In this series there were approximately twice as many males as there were females. Of the total number of patients 771 (66.9 per cent) were males and 382 (33.1 per cent) were females, and of the patients with perforation 255 (75.4 per cent) were males and eighty-three (24.55 per cent) were females.

Race.—Race distribution in general followed that found in the general hospital census. Of the total patients 896 (77.71 per cent) were white and 257 (22.3 per cent) Negro, while among patients with perforation the distribution was 229 (67.75 per cent) white and 109 (32.25 per cent) Negro.

Seasonal Distribution.—The cases studied had a moderately even distribution among the months, although there was a slight rise in the number of admissions during the early summer. The 114 patients admitted in June were the most numerous in any month, while the eighty-five admitted in November were the least.

Delay in Hospitalization.—We were interested in comparing the time from the onset of the disease until admission to the hospital during this period with that of the preceding nineteen years and were gratified to find that there had been a rather marked improvement (table 2). This dangerous period of delay had decreased from forty-four hours to 33.1 hours for the group having unruptured acute appendicitis. In the group with appendical abscess formation it was 145.9 hours as compared with 129.6 hours for the previous period, an increase that is not disturbing in this particular type of case. For those with peritonitis the delay was 64.9 hours as compared with 80.64 hours formerly. The time from onset to admission for all patients with ruptured appendix, including both those with peritonitis and those with abscess formation, was 100 hours. The yearly variation of the delay period was not significant, as it gradually decreased in the acute unruptured type of involvement from 1934 through 1937 and then rose sharply to 45.6 hours in 1938.

Cathartics.—It seems beyond understanding that the public has not as yet become well enough informed about the dangers of acute appendicitis to avoid the use of cathartics when abdominal pain is present. Of the 921 patients with the acute type 410, or 44.5 per cent, gave a history of having taken some cathartic (table 3). Our series clearly illustrates the long known fact that in appendicitis there is a definite correlation between perforation and cathartics, for only 214, or 36.7 per cent, of those with acute unruptured appendicitis gave a history of having taken cathartics, while 196, or 58.0 per cent, of those in whom rupture had occurred reported this. One of the most regrettable facts found in our study of catharsis in appendicitis was that twelve patients reported that they had taken such medication on the advice of their doctor. Magnesium sulfate and castor oil proved to be the most popular purges, some patients having taken both.

TABLE 3.—*Catharsis in Acute Cases*

Pathologic Condition	Number of Patients	Per Cent
Acute unruptured	214	36.7
Acute with perforation	196	58.0
Total	410 (12 on doctor's prescription)	44.5

TABLE 4.—*Mortality and Complications in Peritonitis, Drained and Undrained*

	Drained		Not Drained	
Number of cases	130		55	
	Number	Per Cent	Number	Per Cent
Mortality	21	16.2	5	9.1
Pelvic abscess	12	9.2	7	12.73
Abdominal abscesses	2	1.5	1	1.8
Subphrenic abscesses	5	3.8	1	1.8
Liver abscesses	2	1.5	0	0.0

Clinical Data.—The occurrence of clinical signs and symptoms in our series did not greatly differ from that reported in other series. Abdominal pain occurred in 99.5 per cent of our patients, nausea in 83.9 per cent, vomiting in 70.8 per cent and rectal tenderness in 62.1 per cent, while 56 per cent gave a typical history. Perhaps our figure for rectal tenderness is higher than

should be expected. This sign, of course, depends on the interpretation of the examiner and is subject to personal errors.

Laboratory Data.—The mean temperature for all patients with acute appendicitis was 100.2 F., while the mean white count was 15,196. For those with the unruptured acute type the mean temperature was 100.0 F. and the mean white blood count 14,949. This was not greatly different from the mean temperature of 100.6 F. and the mean white count of 15,609 found for patients having a perforation of the appendix.

Anesthesia.—Of the 1,153 patients in the report 1,130 were operated on. In general it has been our policy to use nitrous oxide-ether anesthesia when operating on patients with appendicitis, as a rule reserving spinal anesthesia or local infiltration of procaine hydrochloride for cases in which general anesthesia is contraindicated. For the 1,130 patients operated on spinal anesthesia was used 135 times, or in 11.9 per cent of the operations, while local was used twenty-two times, or in 1.9 per cent. In all other cases general anesthesia was given. Occasionally during the past three years we have used cyclopropane.

Incision.—There is no doubt that the policy of operating through a McBurney incision whenever appendicitis is diagnosed or suspected has done much to reduce the mortality from this disease at the Cincinnati General Hospital. In this series, 1,097 patients were operated on through McBurney incisions and twenty-two through right rectus incisions. When a right rectus incision was made, the choice of incision was generally due to an error in diagnosis. Of the remaining patients two were operated on through inguinal incisions, two through the flank and two through a midline incision. In both cases in which an inguinal incision was made, an acutely inflamed appendix was found in a hernia sac. Five appendical abscesses were drained through the rectum.

Operators.—The number of surgeons operating on the patients reported in this series was relatively large, nineteen having operated on ten or more.

Position of the Appendix.—In 131 (11.6 per cent) of the cases in which operation was performed, the appendix was partially or completely retroperitoneal, while in sixty-five (5.8 per cent) it was partially or completely pelvic.

Conservative Treatment.—It is impossible to read recent articles on the subject of appendicitis without being impressed with the great enthusiasm which has been aroused by the results of the conservative treatment in certain cases of acute appendicitis with perforation. In spite of this, however, we have not generally adopted this idea, and our small series of conservatively treated patients can in no sense be regarded as a true indication of the value of conservative therapy. Excepting patients with appendical abscess formation, we have used conservative therapy only with those considered too sick for operation, such a course often being determined on after finding abdominal distention in severe cases of peritonitis. Whether or not this policy is wise can be determined only by comparing our results with those of clinics where conservative treatment is resorted to more frequently. In this series there were twenty-three patients who were not operated on, but for only sixteen of these was conservative therapy adopted by choice. Five of the remaining seven refused operation, while failure to operate on two was due to a mistake in diagnosis. There were two additional patients treated conservatively at the beginning who eventually had to be operated on. This raised the total of conservatively treated patients to eighteen, and of this number nine had appendical abscess formation and the other nine peritonitis. Seven of these eighteen patients died, the mortality in this group therefore being 38.8 per cent.

Drainage.—In our efforts to reduce the number of deaths from ruptured appendicitis with peritonitis, we have adopted among other measures the practice of closing the peritoneum without drainage of the abdominal cavity in certain selected cases, and in general our results from this procedure have given considerable satisfaction. The indications which we think constitute a sound reason for failure to drain the abdomen when peritonitis is present will be discussed later. Of fifty-five patients with peritonitis whose abdominal cavity was closed without drainage, five died, a mortality of 9.1 per cent, while of 130 such patients in whom drains were inserted twenty-one died, a mortality of 16.2 per cent (table 4). But in the matter of complicating pelvic abscesses, the results were not so encouraging, as seven, or 12.73 per cent, of those without drainage, as compared with twelve, or 9.2 per cent, of those with drainage had this complication. We may summarize the results of nondrainage of the peritoneal cavity in peritonitis by saying that, although our series is too small to permit dogmatic statements, it has been attended by a reduced mortality but increased incidence of pelvic abscesses.

TABLE 5.—*Postoperative Complications*

Complications	Acute Unruptured (583 Cases)	Peritonitis (209 Cases)	Abscess (129 Cases)	Chronic and Interval (232 Cases)	Total (1,153 Cases)
Wound infection (clean cases)	31	0	0	4	35
Gas bacillus infection of wound	0	0	1	0	1
Hematoma of wound	4	0	0	1	5
Secondary intraperitoneal abscess	7	27	9	0	43
Subphrenic abscess	0	8	1	0	9
Liver abscess	0	2	1	0	3
Fecal fistula	2	2	4	0	8
Peritonitis	2	0	5	1	8
Mechanical bowel obstruction	0	1	0	0	1
Perforation of the ileum and cecum	0	0	1	0	1
Pneumonia	10	11	13	1	35
Bronchitis	3	2	0	2	7
Pleuritis	2	1	1	0	4
Empyema	0	2	2	0	4
Atelectasis	5	5	2	2	14
Pulmonary infarct	0	0	1	0	1
Pulmonary embolism	0	1	0	0	1
Pericarditis	0	1	0	0	1
Arterial thromboses	0	1	0	0	1
Thrombophlebitis	3	1	2	0	6
Pylephlebitis	0	0	1	0	1
Hemiplegia	0	1	0	0	1
Pulmonary hemorrhage	1	0	0	0	1
Intra-abdominal hemorrhage	0	0	1	0	1
Septicemia	0	1	3	0	4
Pyelonephritis	1	0	1	0	2
Perforation of the bladder	0	0	1	0	1
Uremia	1	1	1	0	3
Parotitis	0	2	1	0	3
Abscess of the thigh	1	1	0	0	2
Abortion	2	0	1	0	3

Complications.—The list of complications encountered in this series is too long for detailed discussion and is readily available in table 5. We were surprised to find that of 583 patients with acute unruptured appendicitis thirty-one had wound infections, while of 232 with chronic or interval appendicitis four contracted infections in their wounds.

Period of Hospitalization.—Patients with acute unruptured appendicitis were in the hospital for a mean length of time of 9.6 days. The length of time

spent in the hospital by patients with peritonitis and by those with abscess formation was not greatly different, as the mean time was 20.2 days for the former group and 22.2 days for the latter. Although we did not compute the length of this period for those with chronic or interval appendicitis, such patients are usually discharged from the hospital on the sixth or seventh day after operation. The mean length of the period of hospitalization for the entire series was 12.9 days.

Mortality.—There were fifty-six fatal cases in our series, a mortality rate of 4.86 per cent (table 6). Death and mortality were divided among the various groups as follows: Of the patients with acute unruptured appendicitis six died (mortality 1.03 per cent), in the peritonitis group there were thirty-six deaths (mortality 17.22 per cent), in the appendical abscess group thirteen deaths (mortality 10.08 per cent), and among those with chronic or interval appendicitis there was one fatality (mortality 0.43 per cent). It is impossible to do more than approximately compare the mortality in this series with that of the series covering the previous nineteen year period, except on the basis of total mortality. The reason for this is that in the former series the mortality according to case groups was computed only on the basis of operations. However, all except 115 of the 2,921 patients were operated on. At the present time we do not feel justified in repeating this especially in view of the tendency not to operate on patients with perforated appendicitis. As some of those not operated on during the previous period were moribund and eventually died, any comparison of the mortality in the various types of cases will tend to magnify the improvement which occurred during the past five years. In total mortality the decline of the death rate from 6.4 per cent in the period 1915 to 1933 inclusive to 4.86 per cent in the present series represents a substantial improvement. The death rate in peritonitis decreased from 33.9 to 17.22 per cent, but in the appendical abscess group there was only a slight improvement. In commenting on the increase from 0.86 to 1.03 per cent in the mortality of acute unruptured appendicitis, it is fair to point out that in most cases death was due to causes outside the abdomen.

TABLE 6.—*Mortality*

Pathologic Condition	Number of Cases	Number of Deaths	Mortality, %	Mortality % 1915-1933 (Operative)
Acute unruptured	583	6	1.03	0.86
Peritonitis	209	36	17.22	33.9
Abscess	129	13	10.08	11.4
Chronic and interval	232	1	0.43	0.13
Totals	1,153	56	4.86	6.4 (operative and nonoperative cases)

The lowest yearly mortality was 3.1 per cent in 1936, while the highest was 6.2 per cent in 1938.

We have computed the mortality and pathologic changes in acute appendicitis relative to the duration of the disease at the time of admission to the hospital, and our data have been in accord with the well known fact that delay increases both deaths and perforations. The highest mortality (14.7 per cent) was among patients admitted more than six and one-half days after the beginning of symptoms and the next highest (10.9 per cent) in the group admitted from seventy-two to ninety-six hours after the onset. The lowest mortality (3.8 per cent) was in the group coming to the hospital during the first forty-eight hours. The incidence of acute cases with perforation increased gradually from 21.8 per cent during the first forty-eight hours to 78.7 per cent after six and one-half days.

Causes of Death.—This series substantiates the well known fact that diffuse peritonitis associated with paralytic ileus is the principal cause of death in acute appendicitis. Of the fifty-six fatalities, twenty-seven occurred as a result of diffuse peritonitis. The causes of death in the remaining cases form a long and varied list that is well illustrated in table 7. However, in commenting on the six deaths occurring in the group with acute unruptured appendicitis we would point out that four of the patients had pulmonary complications, including pneumonia, pulmonary hemorrhage and pulmonary embolism, while a fifth died of uremia.

TABLE 7.—*Causes of Death*

Pathologic Condition	Deaths	Cause of Death
Interval	1	Generalized peritonitis
Acute unruptured	1	Generalized peritonitis
	1	Generalized peritonitis and lobular pneumonia
	1	Lobar pneumonia and lobular pneumonia
	1	Uremia
	1	Pulmonary hemorrhage
	1	Pulmonary embolism
	6	
Abscess	3	Lobular pneumonia
	2	Lobar pneumonia
	1	Generalized peritonitis
	1	Pylephlebitis
	1	Heart failure
	1	Retroperitoneal abscess and toxemia
	1	Septicemia and lobular pneumonia
	1	Liver abscess and lobular pneumonia
	1	Generalized peritonitis and septicemia
	1	Cause of death unknown
	13	
Peritonitis	20	Generalized peritonitis
	3	Lobular pneumonia
	2	Generalized peritonitis and lobular pneumonia
	2	Liver abscess
	1	Generalized peritonitis and pericarditis
	1	Generalized peritonitis and liver abscess
	1	Subphrenic abscess and possible rupture into chest
	1	Pulmonary embolism
	1	Hemorrhage from wound
	1	Transfusion reaction
	1	Died on the operating table
	1	Questionable; possible toxemia from r. l. q. abscess
	1	Lobar pneumonia
	36	

COMMENT

In general there has been an improvement in the statistics for the past five years as compared with the previous nineteen, and we believe that our total results compare favorably with those of other similar wholly charity institutions. Sperling and Myrick [8] reported a total mortality of 5.6 per cent (1932 to 1935), Kelly and Watkins [9] 5.4 per cent (1931 to 1936) and Lehman and Parker [10] 3.27 per cent (1933 to 1937). There can be no doubt, however, that the lack of any marked improvement in the mortality from appendical abscess is a rather poor commentary on the treatment of these

8. Sperling, Louis, and Myrick, J. C.: Acute Appendicitis, Surgery **1**: 255 (Feb.) 1937.

9. Kelly, F. R., and Watkins, R. M.: Appendicitis in Adults, J. A. M. A. **112**: 1785 (May 6) 1939.

10. Lehman, E. P., and Parker, W. H.: The Treatment of Intraperitoneal Abscess Arising from Appendicitis, Tr. Am. S. A. **56**: 345, 1938.

cases. Ransom,[11] in a review of the recent literature, has cited the following mortality rates in this particular group of patients: Finney 4.56 per cent, Haggard 5 per cent, Keyes 7.3 per cent and McClure and Altemeier 4.2 per cent. It is readily seen that in all these series the mortality rate of appendical abscess is much lower than the 10.08 per cent in our series. However, the general condition of the private patient and his preoperative and postoperative care undoubtedly account for a great deal of the difference in the figures cited.

During the past few years there has been a definite trend toward greater conservatism in the treatment of appendical abscesses, both in this country and abroad, and the effect has been a lowering of mortality and the stimulation of great enthusiasm on the part of the advocates of this form of treatment. In the series of Lehman and Parker the mortality in the group treated conservatively was only 1.5 per cent, while of the patients operated on by choice 6.2 per cent died. During 1936 and 1937 these authors started conservative therapy on 83.3 per cent of the patients with abscess formation and 65 per cent never had to be operated on.

We believe that it is often good judgment in cases of walled off abscess to observe the trend of the process before deciding what to do, and our tendency has been toward more conservatism in the treatment of patients with this complication. In general, our policy has been to wait for the most favorable time before operating on these patients. However, almost all of those with appendical abscesses in this series were eventually operated on before being discharged from the hospital, a fact which indicates that we have not yet become as conservative as most others who advocate this course. (It is not advisable to remove the appendix when operating on a patient with an abscess unless this can be accomplished without disturbing the walling off process, and when pus is encountered it is wise simply to drain and leave the appendix until it can be removed at a later date.) When the appendix has not been removed the patient is always advised to return six months later for an appendectomy. In commenting on our treatment of appendical abscess and the results we have obtained, it is believed that greater conservatism may have yielded better results.

As contrasted with the mortality of the abscess group, our series mortality of 17.22 per cent in cases of peritonitis has been gratifying, particularly in view of the fact that during the preceding nineteen years the operative mortality alone was 33.9 per cent in this group. Although because of differences in classification it is difficult to make accurate comparisons, the peritonitis mortality in this series compares very favorably with that of other hospitals.

In treating this type of case we believe that it is wise to remove the appendix through a small McBurney incision and to drain or not, depending on the amount of contact necrosis and actual fecal contamination of the peritoneal cavity. While one cannot say dogmatically that the improvement was due solely to the McBurney incision, the mortality in appendicitis at the Cincinnati General Hospital dropped from 9.5 to 5.4 per cent after this type of incision became routine practice. Few patients with peritonitis are treated conservatively, this course usually being reserved for those who are moribund or very poor operative risks.

Yates[12] and others have shown that adequate drainage of the peritoneal cavity is physically and physiologically impossible and, in addition, not entirely without danger. However, it is still difficult for many to decide whether the abdomen should be drained or closed in peritonitis of appendical origin. While we do not agree with Buchbinder's[13] statement that patients with diffuse peritonitis should never have drainage, we do believe that unless extensive necrosis or actual fecal contamination of the peritoneal cavity is present it is better to close the peritoneum and drain the wound down to it. The wisdom of such a course is attested by the low mortality in cases in which we have closed the abdomen without drainage.

At the Cincinnati General Hospital all patients with peritonitis having its origin in the appendix are treated with continuous gastric expression, Fowler's position, intravenous dextrose solution and saline hypodermoclysis until peristalsis returns and the patient is able to take an adequate amount of fluids by mouth. Another therapeutic measure that may have done much to lower the mortality in this group is the practice of giving repeated small blood transfusions.

Since the development of the Miller-Abbott tube for use in the treatment of intestinal obstruction, we have attempted on a few occasions to employ it in the treatment of paralytic ileus associated with peritonitis. However, we have experienced great difficulty in getting the tube into the small intestine, a failure probably attributable to the absence of peristalsis in such cases.

SUMMARY

1. In a series of 1,153 cases of appendicitis treated at the Cincinnati General Hospital, 921 were acute and 232 were chronic or interval. Of the acute cases the appendix was ruptured in 338, or 36.7 per cent, a slight improvement being shown over the preceding nineteen years.

2. The average elapsed time between the onset of symptoms and admission to the hospital was 33.1 hours in acute unruptured appendicitis as compared with forty-four hours during the previous nineteen years. In cases in which the appendix had ruptured, the length of this period was 100 hours.

3. Of the patients with acute appendicitis 410 (44.5 per cent) gave a history of having taken a cathartic. On further analysis it was found that 58.0 per cent of the patients with perforation and 36.7 per cent of those without perforation were guilty of this.

4. The total mortality rate of 4.86 per cent was divided as follows: 1.03 per cent in acute unruptured appendicitis, 17.22 per cent in peritonitis, 10.08 per cent in appendical abscess and 0.43 per cent in chronic and interval appendicitis.

5. In this series we have found a gratifying decrease in the total mortality and in the mortality in peritonitis as compared with that of the previous nineteen years, but the very slight improvement in the abscess group is discouraging.

6. Greater conservatism in treating patients with appendical abscess might have resulted in a decrease in the mortality of this group.

7. In treating peritonitis of appendical origin we consider it wise to remove the appendix through a small McBurney incision and to drain or not, depending on the amount of necrosis and fecal contamination.

11. Ransom, H. K.: Delayed Intervention in Appendical Abscess and Spreading Peritonitis Due to Appendicitis, Internat. Abstr. Surg. **68**: 359, 1939, in Surg., Gynec. & Obst., April 1939.

12. Yates, J. L.: An Experimental Study of the Local Effects of Peritoneal Drainage, Surg., Gynec. & Obst. **1**: 473, 1905.

13. Buchbinder, J. R.: Surgical Limitation in the Treatment of Acute Suppurative Appendicitis, Surg., Gynec. & Obst. **59**: 485 (Sept.) 1934.

CIRCULATORY FAILURE OF CAPILLARY ORIGIN

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Circulatory disturbances may arise from defective action of the pumping mechanism itself, from the agencies which influence the heart's action and from abnormal vasomotor reactions. It is obvious that loss of blood or fluid, directly or indirectly, may disturb the circulation. These causes for circulatory deficiency are discussed adequately in medical literature. But circulatory disturbance originating in the visceral capillary stream bed has not received the attention it merits.

CAPILLARY DISORDER

Increased knowledge concerning the capillaries and their reactions has made possible an analysis of several enigmatic circulatory phenomena. It has been shown (Ebbecke,[1] Krogh,[2] Lewis[3]) that capillaries possess tonus and contractility independent of the adjacent arteries and veins. Capillary endothelium is delicately sensitive to physiologic conditions such as oxygen tension and products of metabolic activity. Likewise it is exceedingly susceptible to the action of a wide variety of noxae, including chemicals, poisonous drugs, anesthetics, venoms, bacterial toxins, products of protein cleavage and the like. Under the influence of any noxious agent the endothelium loses its normal tonus and becomes abnormally permeable to blood plasma. Any agent or condition injurious to capillary endothelium increases its permeability. Landis[4] obstructed an artery by pressure for three minutes. The lack of oxygen thus produced caused a fourfold increase in the permeability of the capillaries in the field supplied by the artery. Various chemical agents injected into the blood caused a sevenfold increase in endothelial permeability.

The pathologic effects of injury to capillary endothelium may be shown diagrammatically as in figure 1.

When the endothelium is injured by any agent or condition, it allows plasma to escape into the tissue spaces, thus producing edema and oftentimes serous effusions. The corpuscles become closely packed in the dilated capillaries and venules, and circulatory stasis results. Stasis of the circulation is the surest sign of increased endothelial permeability (Landis). Correspondingly there occurs an increase in the number of corpuscles per unit volume of blood. If the area of capillary atony is local, the hemoconcentration may be limited to that field. If capillary atony has occurred in extensive visceral areas, the corpuscular content of the systemic circulation is increased in a degree proportional to the total loss of plasma from the blood.

Widespread loss of capillary tonus causes a circulatory deficiency clinically resembling that produced by massive hemorrhage. The two conditions may be differentiated by the hemoconcentration which accompanies the one and the hemodilution which follows any considerable loss of blood by hemorrhage (Moon[5]).

As a result of capillary atony there is a decrease in both the actual and the effective blood volume. The leakage of plasma into the tissue spaces and cavities reduces the actual blood volume and produces hemoconcentration. The sequestration of blood by stasis in dilated capillaries and venules reduces the effective blood volume. This reduction tends to lower the efficiency of the circulation. Physiologically this is compensated by arterial vasoconstriction and by the discharge of blood from reservoir organs such as the spleen. So long as the compensation is effective there is no serious decline in the blood pressure but the latter is maintained at the expense of the volume flow of blood. Maximal arterial constriction may reduce the volume flow far below an adequate physiologic level and seriously reduce the delivery of oxygen to the tissues. Capillary endothelium is delicately sensitive to lack of oxygen (Krogh, Landis). When tissue anoxia develops, the capillaries become atonic and abnormally permeable. This fact supplies the connecting link in the vicious circle of shock. Capillary atony and tissue anoxia are the major factors in the mechanism of this type of circulatory deficiency. Either of these factors, induced primarily by whatever means, presently causes the development of the other. This constitutes a reciprocal relationship which gives the circulatory deficiency a self-perpetuating quality. This relationship is illustrated in figure 2.

Capillary factors are fundamental to this type of circulatory failure. Essentially it results from an uncompensated disparity between the volume of blood and the volume capacity of the vascular system. That disparity arises from a decreased blood volume, as already described, plus an increased volume capacity caused by dilatation of capillaries and venules in extensive areas. When compensation is no longer effective, the blood pressure declines progressively and the complete syndrome of shock is manifested clinically. That syndrome presents a highly characteristic group of clinical features:

Prostration is evident; the patient is profoundly depressed, weak and restless. The pulse is rapid, feeble and of small volume. The extremities are cold and the body temperature is low. The face is drawn, ashen or livid in color, anxious in expression and moist with cold sweat. The eyes are sunken and surrounded by bluish rings, producing the classic hippocratic facies. Thirst is incessant, but attempts to relieve it are ineffective because of vomiting. The fluid vomited is often in excess of that swallowed, and it contains small brown flocculi. Perspiration is profuse, and there may be diarrhea. The respirations are shallow and interspersed with deep sighs. The blood pressure declines progressively. Urination is scanty or suppressed. Consciousness is retained until finally there is loss of sensitivity, of responsiveness to stimuli and of reflexes. Unconsciousness or coma precedes death. It should be noted that sometimes a marked and rapid increase in temperature—agonal fever—precedes death.

The clinical syndrome just described is accompanied by an equally characteristic group of departures from physiologic constants. These are a reduced total and effective blood volume; a reduced minute volume cardiac output and volume flow of arterial blood; hemoconcentration as shown by counts of red cells, hematocrit, specific gravity and hemoglobin content; increased nonprotein nitrogen, dextrose and potassium content of the blood; reduced alkali reserve, chloride and oxygen content, and delayed coagulability of the blood. When this condition is induced experimentally

From Jefferson Medical College.

1. Ebbecke, U.: Ueber Gewebsreizung und Gefässreaktion, Arch. f. d. ges. Physiol. **199**: 197, 1923.
2. Krogh, August: Anatomy and Physiology of the Capillaries, New Haven, Conn., Yale University Press, 1929.
3. Lewis, Thomas: The Blood Vessels of the Human Skin and Their Responses, London, Shaw & Sons, Ltd., 1927.
4. Landis, E. M.: Capillary Pressure and Capillary Permeability, Physiol. Rev. **14**: 404 (July) 1934.
5. Moon, V. H.: Occurrence and Clinical Significance of Hemoconcentration, Ann. Int. Med. **13**: 451 (Sept.) 1939.

by various means, an increased flow of lymph from the thoracic duct is an early and constant feature.

The circulatory deficiency which results from capillary atony is accompanied by a group of characteristic visceral pathologic changes (Moon[6]). These are capillovenous congestion in the thoracic and abdominal viscera, edema of soft tissues such as lungs and mucosae, effusions in serous cavities, and petechial hemorrhages in parenchymatous organs, in serous and in mucous surfaces. It will be noted that these features are directly related to capillary injury. They are morphologic evidences of capillary disorder.

Few conditions of disease have a more characteristic clinical picture, more typical physiologic disorder and more significant visceral changes than those depicted. They are the clinical and pathologic features which are distinctive of circulatory failure of capillary origin. They establish it definitely as a clinical entity. That syndrome may arise from a wide variety of causes, as will be shown presently, but its mechanism is probably the same in all instances. Most important in that mechanism are the reciprocal effects of the two major factors, capillary atony and anoxia.

TRAUMATIC SHOCK

The syndrome described may follow extensive surgical procedures or severe physical trauma. When it arises from such causes it has been called surgical, traumatic or wound shock. Its occurrence and management became a major problem for military surgeons during the World War. The British Medical Research Committee organized an intensive attack on the problem of shock, using cases of severe wounds as clinical material. Eminent surgeons and physiologists of Great Britain, France and the United States cooperated in the endeavor. Because of the number and qualifications of the investigators and the almost unlimited opportunity for observations on wounded men, this investigation is of outstanding significance.

The reports, summarized by Cannon,[7] indicated that the absorption of "toxic" substances from areas of extensive injury was the major factor causing wound shock. Radical surgical procedures, such as débridement of wounds and the amputation of mangled limbs,

Agents or conditions injurious to capillaries	→	Capillary endothelium	→ Pathologic results: Dilatation, Permeability, Stasis, Edema, Effusions, Hemoconcentration

Fig. 1.—Pathologic effects of endothelial damage.

prevented the development of shock or caused early manifestations of it to disappear.

The explanation that traumatic shock results from the absorption of substances from damaged tissues was corroborated by subsequent investigations on the physiology and the reactions of the capillaries. Any type of injury to living cells causes the release of cytoplasmic substances which produce capillary reactions indistinguishable from those produced by histamine (Ebbecke, Lewis). Mild mechanical trauma to the skin causes the release of cytoplasmic substance. This produces increased capillary permeability locally, followed by the development of a wheal. Exactly the same effects result from pricking a minute amount of histamine into the skin.

Ebbecke[8] made the pertinent observation that any agent which will produce a wheal, when applied locally to the skin, will produce the syndrome of shock if its effects are induced systemically. As examples, he showed that histamine, bacterial toxins, various poisons, "lymphagogues," peptone, proteins to which an individual is sensitive, and other agents will produce a wheal if applied locally. The same substances produced shock when injected intravenously. Likewise bee-sting venom, snake venom, bile, cholic salts, emetine, allyl formate and various other agents will produce wheals when applied locally and will cause shock when given intravenously. It appears that the effects of such agents are due to their action on capillary endothelium and that the difference between the local and the systemic effects is quantitative rather than qualitative. Ebbecke holds that wheals are analogous to shock in that the two result from the same condition—dilatation of capillaries and increased permeability of the endothelium.

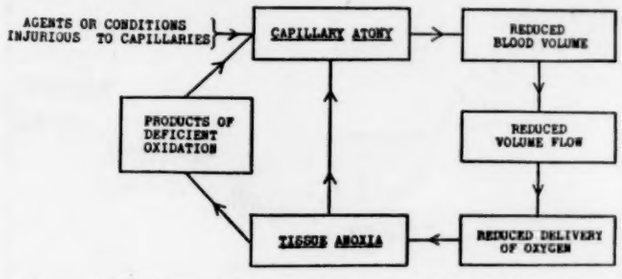

Fig. 2.—The vicious circle. For factors accessory to this mechanism see figure 5.

It has been known for many years that aqueous extracts of normal tissues will produce immediate changes in arterial pressure if injected into the blood stream. Small doses of some of these will cause the pressure to rise while larger doses produce an effect like that of histamine. This effect is illustrated in figures 3 and 4.

It was once thought that the histamine present in normal tissues might be responsible for the decline in blood pressure caused by absorption from areas of trauma or by the injection of tissue extracts. That idea was not supported by Dale[9] and his associates. They stated that the circulatory effect of histamine is like that of tissue extracts, bacterial toxins, peptone and other products of protein cleavage. But the amount of histamine present in normal tissues is too minute to produce the depressor effects noted.

Dale, Lewis and Krogh endorse the interpretation that shock resulting from extensive trauma or burns is caused by the absorption of substances released from injured tissues and by the effects of these on the visceral capillary stream bed. Cytoplasmic substance is not toxic in the sense commonly implied by that term. This fact modifies the original concept of traumatic toxemia —a modification which can be expressed distinctly by the clumsy phrase "traumatic a-toxic toxemia." A more exact designation would be "traumatic anoxia." For the

6. Moon, V. H.: Shock and Related Capillary Phenomena, New York, Oxford University Press, 1938.
7. Cannon, W. B.: Traumatic Shock, New York, D. Appleton & Company, 1923.
8. Ebbecke, U.: Capillärerweiterung und Schock, Klin. Wchnschr. **2**: 1725 (Sept. 17) 1923.
9. Dale, H. H.: The Activity of Capillary Blood Vessels and Its Relationship to Certain Forms of Toxemia, Brit. M. J. **1**: 959 (June 9) and 1006 (June 16) 1923.

sake of accurate thinking, either the term traumatic toxemia should be avoided or, if used, the absence of any truly toxic factor should be understood.

A COMBINATION OF FACTORS

It was emphasized that shock occurring under conditions of warfare often results from a combination of factors rather than from a single one. These factors included absorption from injured areas, delay in operative treatment, anesthesia, hemorrhage, infection, exposure, exhaustion, cold and emotional reactions. Shock unaccompanied by significant hemorrhage was characterized by hemoconcentration, the degree of which was proportional to the degree of shock. When much blood had been lost by hemorrhage, hemodilution was noted. These cases responded well to transfusions or to the intravenous injections of saline solutions. Cases of severe shock from trauma were unresponsive to any form of treatment.

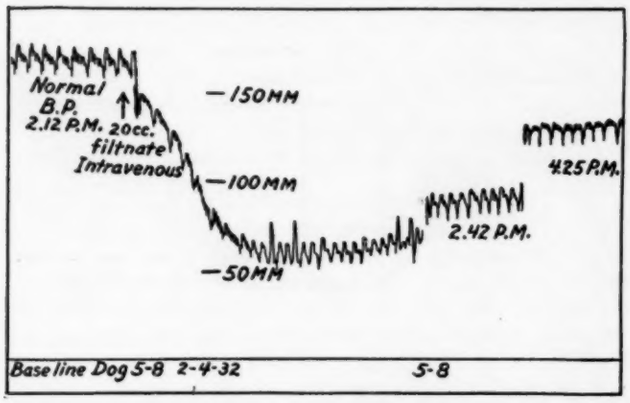

Fig. 3.—Effects on blood pressure resulting from the injection of a neutralized, fat-free, aqueous extract of normal dog muscle.

It should be emphasized that shock following accidental injuries is likewise the result of a combination of factors. Also the circulatory failure which arises after extensive surgical procedures combines the effects of the disease which necessitated the operation, the anesthetic, the trauma to various tissues, and such hemorrhage and loss of fluid as resulted from the operation itself. Although the surgeon may assume, in a given case, that one or another of these is the chief factor, it usually is not possible to secure definite evidence supporting the assumption or evaluating accurately the importance of the other factors.

Most of the methods used for producing shock experimentally likewise entailed combinations of confusing factors which rendered the results questionable. Highly important among these is anesthesia. Frequently a wounded soldier whose condition was not critical developed severe shock immediately when anesthetized for operation. Dale and Laidlaw [10] found that the injection of histamine in doses of 1 or 2 mg. per kilogram caused fatal shock in cats anesthetized with ether. Unanesthetized cats often will survive ten times that dosage. The barbiturates, in the dosage used in animals for experimental purposes, frequently cause low blood pressure sometimes ending fatally. Gruber and Baskett [11] reported that moderate doses of barbital compounds, from 0.05 to 0.5 Gm. per kilogram, caused a fall in blood pressure in 162 of 164 animals tested. My personal experience supports the experience of others, that frequently a marked decline in blood pressure results from barbital anesthesia independent of experimentation.

Hemorrhage and loss of fluid into injured or inflamed tissues is another complicating factor of importance. That extensive hemorrhage will cause a decline in blood pressure and other signs of shock is known by every one. In many of the experiments reported, the hemodilution which occurred before death, the extensive hemorrhages found in the traumatized areas and the pale and ischemic appearance of the viscera after death all supported the authors' contention that hemorrhage was the predominant factor in those experiments. However those experiments provided no means for evaluating the effects of absorption or of anesthesia. Experiments so arranged have little value in determining the relative importance of absorption, anesthesia and hemorrhage because those factors are indeterminably combined in the same experiment. A single formula containing three indeterminate variables is an absurdity, and proposed evaluations which disregard those variables are undependable.

Experiments of short duration are not suitable for evaluating the effects of absorption in causing circulatory disturbances. Secondary shock resulting from extensive damage to soft tissues, as seen in wounded soldiers, did not appear immediately but developed from four to twenty-four hours later. Shock resulting from the absorption of tissue substance implanted in the peritoneal cavity results fatally in from ten to thirty-six hours. In more than sixty experiments of this type the shortest interval between the implantation of the tissue pulp and the fatal outcome was ten and one-half hours (Moon).

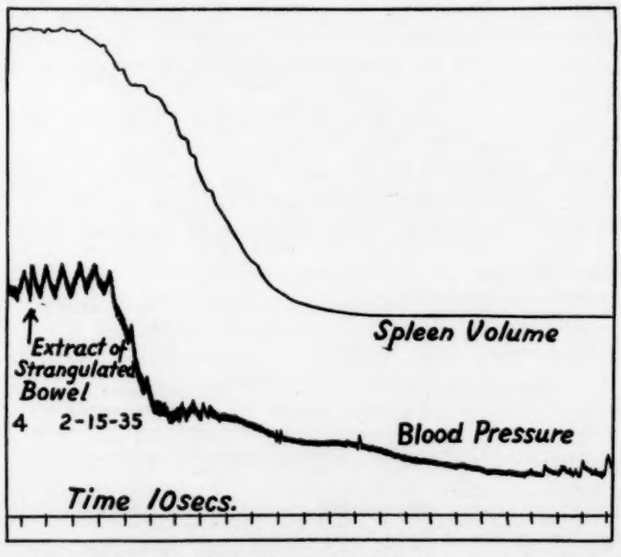

Fig. 4.—Effects of injecting a neutralized, fat-free, aqueous extract of intestinal mucosa. Note the sharp reduction of splenic volume. Apparently the spleen discharged its excess volume of blood, tending to counteract the circulatory deficiency.

When experiments on shock produced by trauma terminate in less than four hours, it is improbable that absorption of substances derived from damaged tissue is a significant factor. In such cases the circulatory deficiency arises chiefly from the effects of anesthesia plus the loss of blood and fluid into the traumatized areas, and perhaps from other factors.

A method commonly used in studies on shock is to narcotize an animal deeply with barbital or a similar

10. Dale, H. H., and Laidlaw, P. P.: Histamine Shock, J. Physiol. **52**: 355 (March) 1919.
11. Gruber, C. M., and Baskett, R. F.: The Effect of Phenobarbital (Luminal) and Sodium Phenobarbital (Luminal-Sodium) upon Blood Pressure and Respiration, J. Pharmacol. & Exper. Therap. **25**: 234 (April) 1925.

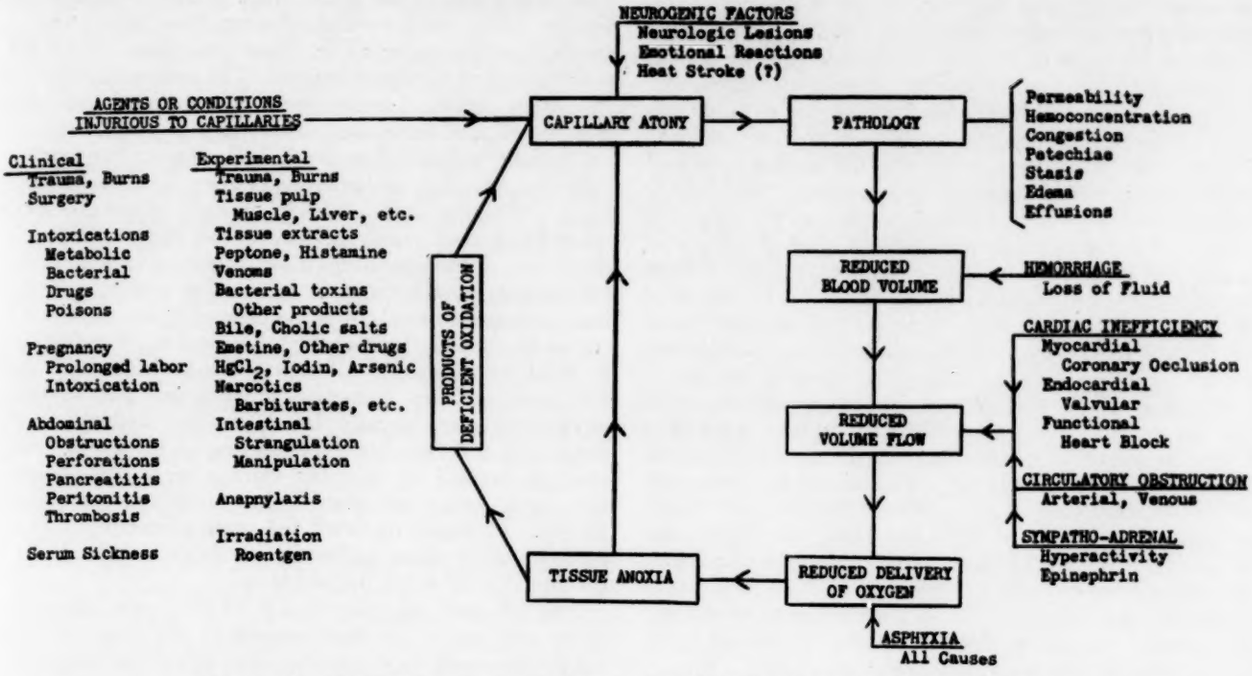

Fig. 5.—The vicious circle and accessory factors. For full explanation see the accompanying text.

drug. An arterial cannula is inserted, and the blood pressure and pulse rate are recorded kymographically through a manometer. Variations in these have been used as the sole criterion of shock in most of the experimental work reported. Shock is then induced by extensive trauma to the muscles, by prolonged manipulation of the intestines or by some other form of tissue abuse. Such methods are open to serious objections:

A decline in blood pressure is not an accurate criterion. It often results from other conditions and it does not occur early in shock but appears only after both blood volume and volume flow have been reduced.

The deep narcosis used often causes low blood pressure and other shocklike manifestations.

Variable amounts of blood and fluid are lost incident to the trauma. In some reports the workers showed convincing evidence that they were dealing almost entirely with hemorrhage.

Under such conditions of experimentation the recorded phenomena may be due to the narcotic, to absorption, to the associated hemorrhage or in part to each. This combination of indeterminate factors has contributed to undependable conclusions and to confusion.

THE MECHANISM OF CIRCULATORY FAILURE OF CAPILLARY ORIGIN

As stated in a preceding section, circulatory failure of capillary origin results from a disparity between the volume of blood and the volume capacity of the vascular system. That disparity results from the reciprocal effects of two major factors: capillary atony and tissue anoxia. Several secondary factors are concerned in the self-perpetuating cycle which develops when either capillary atony or tissue anoxia arises from any cause. These factors, their origin and their relationship to the vicious circle of shock can best be presented diagrammatically (fig. 5).

It is seen that a wide variety of clinical and experimental conditions may cause capillary atony and may thereby give rise to circulatory deficiency of capillary origin. I have included under clinical conditions only those with which I have had personal experience. These presented the clinical picture of shock or collapse, and the postmortem appearances were those regularly found after death by shock. Also under experimental conditions only those agents have been listed which I have used experimentally. In each instance these agents produced progressive circulatory deficiency accompanied by hemoconcentration and by the congestive visceral changes which are characteristic of circulatory failure of capillary origin. Undoubtedly many other conditions, both clinical and experimental, should be added to those listed.

The diagram is largely self explanatory, but a few comments may clarify certain points which otherwise might be obscure. It is known that lesions of the central nervous system, such as hemorrhages, trauma, abscesses or neoplasms, may produce shocklike manifestations. The circulatory disturbance arising from such causes is accompanied by hemoconcentration, and the postmortem manifestations are of the same pattern as has been described. It is apparent that the tonus of the capillary stream bed is subject to influences of central nervous system origin, but the relationship of these to capillary reactions and tonus is obscure. Many surgeons have commented on fright, apprehension and other emotional reactions as causes contributory to shock, but the physiologic mechanism of this effect has not been shown.

Heat stroke is followed by circulatory collapse of the type under discussion. Hill [12] observed that "at postmortem the organs of a case of heat stroke show capillary congestion as in wound shock." Le Count [13] confirmed these observations. The exact mechanism by which heat stroke causes death is not known but many believe it to be through effects on the central nervous system. These factors are illustrated in the diagram as producing capillary atony directly, although

12. Hill, Leonard: The Physiological Aspect of Heat Stroke, Brit. M. J. **1**: 397 (March 20) 1920.
13. Gauss, H.; Meyer, K. A., and Le Count, E. R.: Heat Stroke. Report of One Hundred and Fifty-Eight Cases from Cook County Hospital, Chicago. Am. J. M. Sc. **154**: 554 (Oct.) 1917.

the author recognizes that the effects may be exerted indirectly through some other medium.

The shock type of circulatory failure may originate in any one of the chief factors in the cycle as diagramed. For example, a serious loss of blood or of fluid will reduce the blood volume, hence reducing the volume flow and the delivery of oxygen to the tissues, and will thereby initiate the action of the vicious circle. It is well known that the clinical condition which develops after severe hemorrhage presents most of the features which are characteristic of secondary shock. Many investigators (Blalock,[14] Phemister,[15] Freedlander,[16] Harkins,[17] O'Shaughnessy,[18] Holt,[19] Freeman[20] and their associates) have shown experimentally that hemorrhage will produce circulatory failure of the shock type. One of Freeman's experiments is significant in this connection. An unanesthetized dog was reduced to a state of circulatory deficiency by the successive withdrawal of quantities of blood. This blood was preserved in an uncoagulated state. When the animal's blood pressure had been low for some time, the reinjection of the entire volume of blood which had been withdrawn did not restore circulatory efficiency. This experiment illustrates the fact that the vicious circle of shock can be initiated by direct loss of blood, resulting in an irreversible circulatory deficiency.

It should be emphasized that hemorrhage operates by reducing the oxygen-carrying capacity of the blood. This effect results only when the erythrocytes and hemoglobin are reduced below 35 per cent of normal. This condition can be detected readily by the hemodilution which accompanies it. A transfusion of blood will restore circulatory efficiency in such a case if given before tissue anoxia has developed in a degree sufficient to cause capillary atony systemically.

Hemorrhage and loss of fluid into the traumatized tissues may be a factor of great importance after extensive trauma. Any loss of blood or of fluid is of consequence when circulatory deficiency threatens. Its importance will be proportional to the amount of blood and/or fluid lost. However it is unsafe to conclude that, because hemorrhage and loss of fluid will produce shock, all shock results from hemorrhage and loss of fluid.

The operation of the vicious cycle may be initiated by agents which reduce the volume flow of blood. Any marked reduction of volume flow will reduce correspondingly the delivery of oxygen to the tissues, thereby producing tissue anoxia and subsequent capillary atony. The characteristic clinical syndrome of shock is produced when, as a result of coronary occlusion not immediately fatal, the heart's action becomes inefficient. This duplicates shock from other causes in every particular. The postmortem observations after such a fatality are the same as in other conditions of circulatory failure of capillary origin. The vicious circle arising from cardiac inefficiency operates in the same manner as if it originated otherwise.

Reduced volume flow produced by retarding the circulation will also initiate the operation of the vicious circle. Cannon and Cattell[21] applied adjustable pressure, by a mechanical device, to the outer surfaces of the heart. This limited its diastolic filling and decreased the minute volume output. When low arterial pressure had been maintained for some time, the obstruction was removed, but the circulatory deficiency progressed to a fatal termination. Janeway and Jackson,[22] and Erlanger and his associates,[23] retarded the systemic circulation mechanically by adjustible clamps on the vena cava and, in other experiments, on the aorta. After varying periods of time the clamps were removed but the circulatory deficiency, thus initiated, progressed fatally. Erlanger reported the same evidences of capillary stasis in these cases as in shock resulting from epinephrine or from tissue abuse.

Swingle and his associates[24] showed that adrenalectomy will cause the development of the complete syndrome of shock in dogs, and that injections of adrenal cortex extract will prevent shock or will cause it to abate in adrenalectomized animals. Later they showed that one function of the cortical hormone is to maintain the normal tonus of capillary endothelium. Deficiency of this function, resulting in capillary atony, explains satisfactorily the development of circulatory failure in adrenalectomized animals. However, these authors refrained from concluding that, since lack of cortical hormone will cause shock, such lack is the sole cause or even a major cause for shock.

It has been suggested (Freeman) that hyperactivity of the sympatho-adrenal system, excited by pain, irritation to tissues or emotional reactions, may result in maximal arterial constriction. This, if long sustained, might reduce the delivery of oxygen sufficiently to cause tissue anoxia and thereby to initiate the operation of the same vicious circle. This theory received support from the fact that epinephrine, given in large doses or in smaller amounts by continuous infusion, will produce the complete clinical and pathologic picture of shock.

However, it has not been demonstrated that the amount of epinephrine necessary to produce shock could be derived from the animal's own adrenal glands. It has been shown (Swingle and his associates) that adrenalectomized animals, maintained in a normal physiologic state by adrenal cortex extract artificially supplied, may be thrown into shock readily by the various agents which are used to produce that condition. Also it has been shown (Freedlander and Lenhart) that shock may be induced in animals which have recovered from bilateral sympathectomy as easily as in normal animals. The influence of the sympatho-adrenal system is eliminated in such experiments as described. It would appear that hyperactivity of the sympatho-

14. Blalock, Alfred: Shock Following Hemorrhage, Arch. Surg. **15:** 762 (Nov.) 1927; Experimental Shock: The Cause of the Low Blood Pressure Produced by Muscle Injury, ibid. **20:** 959 (June) 1930; Experimental Shock: The Probable Cause for the Reduction in the Blood Pressure Following Mild Trauma to an Extremity, ibid. **22:** 598 (April) 1931.

15. Parsons, Eloise, and Phemister, D. B.: Hemorrhage and Shock in Traumatized Limbs: Experimental Study, Surg., Gynec. & Obst. **51:** 196 (Aug.) 1930.

16. Freedlander, S. O., and Lenhart, C. H.: Traumatic Shock, Arch. Surg. **25:** 693 (Oct.) 1932.

17. Harkins, Henry N.: The Bleeding Volume in Severe Burns, Ann. Surg. **102:** 444 (Sept.) 1935; Experimental Burns: The Rate of Fluid Shift and Its Relation to the Onset of Shock in Severe Burns, Arch. Surg. **31:** 71 (July) 1935.

18. O'Shaughnessy, Laurence, and Slome, David: Etiology of Traumatic Shock, Brit. J. Surg. **22:** 589 (Jan.) 1935.

19. Holt, R. L., and Macdonald, A. D.: Observations on Experimental Shock, Brit. M. J. **1:** 1070 (June 16) 1934.

20. Freeman, N. E.: Decrease in Blood Volume After Prolonged Hyperactivity of the Sympathetic Nervous System, Am. J. Physiol. **103:** 185 (Jan.) 1933. Freeman, N. E.; Shaw, J. L., and Snyder, J. C.: Peripheral Blood Flow in Surgical Shock: Reduction in Circulation Through Hand Resulting from Pain, Fear, Cold and Asphyxia, with Quantitative Measurements of Volume Flow of Blood in Clinical Cases of Surgical Shock, J. Clin. Investigation **15:** 651 (Nov.) 1936.

21. Cannon, Walter B., and Cattell, McKeen: Experimental Traumatic Shock, The Critical Level in a Falling Blood Pressure, Arch. Surg. **4:** 300 (March) 1922.

22. Janeway, H. H., and Jackson, H. C.: The Distribution of Blood in Shock, Proc. Soc. Exper. Biol. & Med. **12:** 193, 1914-1915.

23. Erlanger, Joseph; Gesell, Robert; Gasser, H. S., and Elliott, B. L.: An Experimental Study on Surgical Shock, J. A. M. A. **69:** 2089 (Dec. 22) 1917.

24. Swingle, W. W.; Pfiffner, J. J.; Vars, H. M.; Bott, P. A., and Parkins, W. M.: The Function of the Adrenal Cortical Hormone and the Cause of Death from Adrenal Insufficiency, Science **77:** 58 (Jan. 13) 1933. Swingle, W. W.; Parkins, W. M.; Taylor, A. R., and Hays, H. W.: Study of Circulatory Failure of Adrenal Insufficiency and Analogous Shock-like Conditions, Am. J. Physiol. **123:** 659 (Sept.) 1938.

adrenal system is not an adequate explanation for shock resulting from the usual causes.

A series of recent experiments (Moon, Kornblum and Morgan [25]) have a direct bearing on shock resulting from absorption from injured areas, independent of sympatho-adrenal activity. It is well known that high voltage abdominal roentgen therapy may be followed, after an interval of several days, by severe circulatory deficiency. Clinicians and roentgenologists have commented (Rolleston [26] for review) that irradiation sickness closely resembles shock resulting from extensive burns, intestinal obstruction, anaphylaxis or trauma. A group of dogs were subjected to deep abdominal roentgen irradiation. The results confirmed those of others (Hall and Whipple [27]) that manifestations of shock develop not immediately but after an interval of several days. The circulatory deficiency was accompanied by hemoconcentration like that produced in various other types of experiments. After death the visceral appearances were of the same pattern as in shock originating otherwise.

My associates and I have confirmed the observations of Hall and Whipple that exposure to x-rays, as described, results in delayed necrosis of the intestinal mucosa. It appears that the resulting circulatory disturbances are produced by the absorption of cellular substances from the degenerated and necrotic mucosa.

Experiments of this type eliminate pain and emotional reactions, as well as hemorrhage and anesthesia, as possible factors. It would be difficult to explain shock resulting from irradiation on the basis of hyperactivity of the sympatho-adrenal system.

Asphyxia, from whatever cause, produces tissue anoxia directly. If this is gradual in onset, it results in clinical manifestations like those which characterize shock arising from various causes. This is seen in cases of carbon monoxide or illuminating gas poisoning of severe degree but not immediately fatal. It may be duplicated experimentally by causing animals to inhale inert gases or by limiting gradually the supply of oxygen in a closed cabinet. The visible evidences of capillary damage after death by asphyxia are the same as those resulting from capillary atony originating otherwise.

The instances given illustrate the fact that circulatory deficiency of capillary origin may arise in any one of the secondary factors shown in the diagram. These secondary factors directly or indirectly cause the development of tissue anoxia and thereby introduce a self-perpetuating quality because of the reciprocal action of the two primary factors—capillary atony and tissue anoxia.

The Mechanism of Water Balance and of Absorption.—Animal bodies are provided with a delicately balanced mechanism for regulating the transfer of water between the blood and the tissues in either direction. The tissues constitute a reservoir from which fluid may be drawn into the blood as needed. When much fluid has been lost as by vomiting, diarrhea or perspiration, the water supply being limited, the tissues become dehydrated but the water content of the blood is not notably affected. This is true only so long as the mechanism of "water balance" is functioning. That mechanism depends on a number of factors, including capillary blood pressure, colloidal osmotic pressure, electrolytes, molecular and ionic concentrations, hormonal substances and perhaps other agents. But the action of these forces in preserving physiologic relationships between the intravascular and extravascular fluids is absolutely conditioned on the presence of a normal semipermeable membrane—the endothelium—between them. Capillary walls so altered from their physiologic state that they allow whole plasma to leak out into tissue spaces are incapacitated for creating or maintaining a normal differential between the composition of intravascular and extravascular fluids. The entire mechanism of water balance is thrown out of gear by a serious alteration in the permeability of the endothelial membranes.

The absorption of fluid from the gastrointestinal tract or from tissues depends on normal capillary function. The thirst which accompanies shock expresses the call of the blood for fluid. But efforts to supply it, either by mouth, by rectum or by hypodermoclysis, are ineffective if the circulatory deficiency has progressed to an advanced stage. Fluid given by mouth is soon vomited or is not absorbed; likewise that given by rectum or by injection. Underhill [28] and others have shown that animals about to die of shock resulting from burns of the skin may be injected subcutaneously with lethal doses of strychnine without effect. Normal controls, similarly injected, died from the effects of strychnine before the burned animals died of shock. Such observations and experiments indicate that the mechanism both of water balance and of absorption is seriously deranged when capillary atony has developed extensively or when the circulatory deficiency of shock has reached an irreversible stage.

SUMMARY

Circulatory failure of capillary origin produces a clinical syndrome which is highly characteristic. This is accompanied by an equally characteristic group of abnormal physiologic and biochemical features. These constitute the clinical syndrome of shock.

The gross and microscopic changes seen post mortem are equally significant. These consist of evidences of capillary damage, such as dilatation, stasis, petechial hemorrhages, edema and effusions, present in extensive visceral areas. These features are etiologically related to the mechanism by which circulatory deficiency of capillary origin develops.

Hemoconcentration is a highly valuable clinical sign indicating the early stages of this condition. It occurs before other signs of circulatory deficiency are manifest.

The mechanism of this type of circulatory failure includes the reciprocal effects of two major factors—capillary atony and tissue anoxia. Either of these factors will presently cause the development of the other. This reciprocal action gives the circulatory deficiency a self-perpetuating quality which tends toward an irreversible condition.

Few conditions of disease present a more characteristic group of clinical features, physiologic abnormalities and morphologic visceral changes. This syndrome, if caused by a single etiologic agent, would constitute an entity among diseases. But the origin of this syndrome is highly diversified.

It may originate from the numerous and varied agents and conditions which may injure directly the capillary endothelium, from loss of blood and/or fluid sufficient to produce systemic anoxia, from agents or

25. Moon, V. H.; Kornblum, Karl, and Morgan, D. R.: The Nature and Pathology of Irradiation Sickness, to be published.
26. Rolleston, Humphry: Critical Review: Harmful Effects of Irradiation X-Rays and Radium, Quart. J. Med. **23**: 101 (Oct.) 1930.
27. Hall, C. C., and Whipple, G. H.: Roentgen Ray Intoxication: Disturbances in Metabolism Produced by Deep Massive Doses of Hard Roentgen Rays, Am. J. M. Sc. **157**: 453 (April) 1919.
28. Underhill, F. P.; Carrington, G. L.; Kapsinow, Robert, and Pack, G. T.: Blood Concentration Changes in Extensive Superficial Burns and Their Significance for Systemic Treatment, Arch. Int. Med. **32**: 31 (July) 1923.

conditions which reduce the volume flow of blood below physiologic limits, from asphyxia of external or internal origin or from various combinations of the conditions mentioned.

Efforts to combat this type of circulatory deficiency will be directed toward the recognition and removal of the cause and toward interrupting the operation of the vicious circle. If the former cannot be accomplished, the latter will be ineffective.

Until some agent is found which will prevent or relieve capillary atony, efforts to interrupt the cycle should be directed toward the restoration of blood volume and toward relieving the anoxia. The tendency to progress toward irreversibility requires early recognition and action. Hemoconcentration is recommended for recognizing the early stages of circulatory deficiency of this type.

THE DURATION OF REMISSION IN PERNICIOUS ANEMIA WITH LIVER THERAPY

THE EFFICACY OF MASSIVE DOSES ADMINISTERED AT ONE TIME

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AND
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BOSTON

Dosage of liver extracts used in the treatment of pernicious anemia has been discussed at length and no longer presents a serious problem. What the time interval between injections of liver extract should be has scarcely been studied. The present availability of highly concentrated liver extracts for general use in the treatment of pernicious anemia makes this problem one of considerable practical importance. One can easily inject at one time as many U. S. P. units of liver extract as have been found necessary for maintenance over a period of from six to twelve months when given in divided doses at frequent intervals. Such a procedure, although it may produce temporary local discomfort, would be convenient for the patient and would save considerable time. A study of four patients by Miller [1] in 1936 suggested the feasibility of such a method of treatment, and observations made by several members of this medical unit during the past seven years have suggested that this type of therapy might be useful.

Convenient though such a procedure might be, it must be remembered that it does not seem physiologically ideal. One would hardly endeavor to prevent scurvy or rickets by the monthly administration of a gallon of orange juice or a pint of cod liver oil. Since pernicious anemia is a form of starvation (that is, starvation as far as the specific antianemic material is concerned) the daily administration of the missing material would more closely simulate physiologic conditions. Certainly normal human beings manufacture their own "liver extract" daily, and with oral liver or stomach therapy the daily method of treatment is customary. Parenteral liver therapy has many advantages over oral treatment and is today the method of choice. Patients who receive injections always desire to make the intervals between treatments as long as possible.

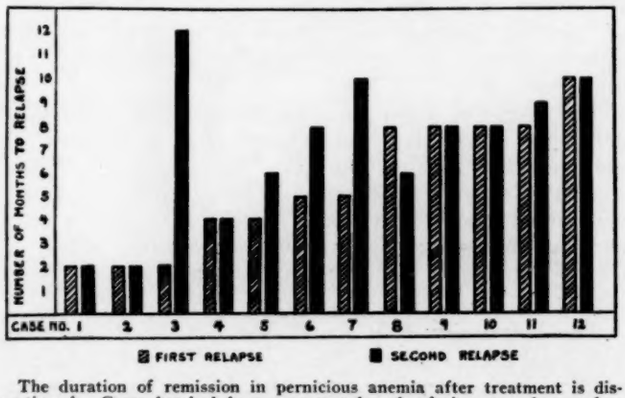
The following observations were made in an endeavor to determine the capacity of the patient with pernicious anemia to store injected liver extract in excess of the immediate requirements and to determine whether rapid depletion or lack of utilization of such stored material might render large injections at long intervals unfeasible.

OBSERVATIONS

Fifteen patients with classic addisonian pernicious anemia, none of whom had significant spinal cord involvement or, at the time, any other symptoms attributable to pernicious anemia and who had maintained an erythrocyte level of 4,500,000 cells per cubic millimeter or higher for an average period of three years, were selected for study. These patients had received intramuscularly during this period 10 cc. of a liver extract [2] prepared according to the directions of Strauss, Taylor and Castle [3] every four weeks. These particular patients were chosen because of the relatively small amount of liver extract which they required for maintenance and because they did not have serious central nervous system involvement. Thereafter all liver therapy was omitted.

Three of the fifteen original patients showed no signs of anemia until nineteen, twenty-six and twenty-seven months, respectively, after liver therapy was stopped. These three patients were not studied further but received routine liver extract therapy, which quickly produced remission.

The remaining twelve patients developed anemia with a red blood cell count on two or more consecutive examinations of 4,000,000 cells per cubic millimeter or less within a period of ten months as shown in the chart. At the time of relapse each of these twelve patients received 160 cc. of the same liver extract intramuscularly during a period of one week. This dose of



The duration of remission in pernicious anemia after treatment is discontinued. Cross hatched bars represent length of time to relapse after discontinuance of monthly injections of 10 cc. of liver extract. Solid bars represent length of time to relapse after single massive injection of 160 cc. of liver extract (1 cc. of extract equivalent to approximately 1 U. S. P. unit).

160 cc. was 30 cc. more than the amount which had been given in divided doses over a period of a year, during which time these patients' red blood cells had remained at essentially normal levels. The additional 30 cc. was known to be an amount sufficient to produce

From the Thorndike Memorial Laboratory, Second and Fourth Medical Services (Harvard), Boston City Hospital, and the Department of Medicine, Harvard Medical School.

1. Miller, F. R.: Effect on Pernicious Anemia of Massive Doses of Parenteral Liver Extract, Proc. Soc. Exper. Biol. & Med. **33**: 580 (Jan.) 1936.

2. Although the Advisory Committee of the United States Pharmacopeia has not assigned a unit value to this material, we judge from our observations that 1 cc. contains approximately 1 unit. Eli Lilly & Co., Indianapolis, supplied this material.

3. Strauss, M. B.; Taylor, F. H. L., and Castle, W. B.: Intramuscular Use of Liver Extract, J. A. M. A. **97**: 313 (Aug. 1) 1931.

a complete return to normal blood levels from the relatively slight anemia that had developed in the period without treatment.

After this massive dose each of these twelve patients was observed at intervals of four weeks, but no further liver therapy was administered. Each patient had 5,000,000 erythrocytes or more per cubic millimeter within a month after this large dose of liver extract. Relapse again occurred in these twelve patients at intervals varying from two to twelve months, as indicated in the chart. In general, the length of the remission appeared to be a function of the individual patient rather than of the treatment. However, patients 3 and 7 are worthy of special comment. The former relapsed the first time within two months after the maintenance liver injections were stopped but did not relapse after massive therapy for twelve months, and the latter had a ten months remission after massive therapy compared with five months in the first instance.

COMMENT

Richter, Ivy and Kim [4] in 1932 demonstrated that the liver of a patient with treated pernicious anemia contained as much "liver extract" as a normal liver, whereas the liver of a person dying of untreated pernicious anemia contained no demonstrable amount of this material. Thus there appears to be no difficulty in storage of liver extract in the liver and, by inference, in the kidneys and other organs of the patient with pernicious anemia. The fact that many of the patients relapsed in a relatively short period of time after liver extract therapy was omitted may be taken to indicate either that they failed to store the excess liver extract injected or that depletion occurred independently of the requirements for blood formation. Patients 3 and 7 may be exceptions or may represent chance variation. If the physiology of liver extract is analogous to that of thiamin (vitamin B_1), both storage and depletion are involved. It has been shown that the daily excretion of thiamin in the urine and feces of animals [5] increases in direct proportion to the daily intake to such an extent that at very high levels of intake there is almost 100 per cent excretion. Furthermore, when animals previously receiving adequate diets are deprived of thiamin,[6] four fifths of the thiamin stored in the liver is depleted, chiefly by excretion, within a week.

Whatever the mechanism involved, the observations recorded in this communication indicate that the majority of patients, even those with uncomplicated pernicious anemia, cannot be safely treated by injections of liver extract at long intervals even if massive amounts are given. Since two of the twelve patients had already relapsed in eight weeks, it seems probable that injections should be given at intervals not longer than half this period; that is, four weeks. As a matter of clinical judgment, it appears that shorter intervals are frequently advantageous so that treatment should be given at from one to four week intervals, depending on the individual case. This does not imply that patients cannot maintain remissions without treatment for longer periods of time. Indeed, before liver therapy was introduced remissions lasting for two or three years were not unknown, although after "spontaneous" remission, which occurred in the majority of cases, 24 per cent of patients again relapsed within three months, while 51 per cent had remissions lasting longer than six months.[7]

A comparison of the length of time before relapse occurred in our series with that in Cabot's [7] series of "spontaneous" remissions is shown in the table. However, it must be remembered that in very few spontaneous remissions did the red cell level reach 5,000,000 cells per cubic millimeter and relapse usually meant counts of 3,000,000 cells per cubic millimeter or less. In fact, a patient with pernicious anemia who maintained a level of 3,500,000 to 4,000,000 cells per cubic millimeter was considered to be getting along very well in remission, whereas we have taken this level to indicate relapse. If one bears these facts in mind, it appears that the duration of "liver induced" remission after treatment is omitted does not differ strikingly from that after "spontaneous" remission.

If the three patients who did not relapse after treatment was omitted for from one and one half to over two years had been kept under routine treatment, one might have concluded that it was the treatment which was solely responsible for their satisfactory maintenance in remission.

Percentage of Patients with Pernicious Anemia Showing Relapse

Time Required for Relapse	Cabot's Series, Percentage	Present Series, Percentage: Relapse After Omission of Monthly Maintenance Injections	Present Series, Percentage: Relapse After Massive Single Dose
1-3 months	24	20	16
3-6 months	25	27	25
More than 6 months	51	53	59

Furthermore, should an attempt be made to determine the potency of a liver extract by its effect in maintaining satisfactory erythrocyte levels, cases such as these might lead to extremely erroneous conclusions. An even more extreme case is represented by a patient with typical pernicious anemia who received 10 cc. of the liver extract, given the patients already cited, in August 1932, at a time when his erythrocytes numbered 800,000 per cubic millimeter. This had been his third relapse supposedly due to previously inadequate treatment. Nevertheless, after this single injection his erythrocyte level rose to 5,000,000 per cubic millimeter and remained there without further treatment until 1938. Although it is of course rare to encounter this in a case of such severe anemia, we know of at least three other similar cases. It is to be emphasized that the observations recorded in this paper were made on subjects who had rather mild and uncomplicated pernicious anemia and who required relatively little liver extract to maintain normal blood levels. Patients with spinal cord involvement, chronic infections or nitrogen retention and those who for no ascertainable reason require much larger amounts of liver extract for maintenance will generally suffer from relapse much sooner after liver therapy is omitted. Significant declines in erythrocyte levels may occur in such cases within a few weeks.

CONCLUSIONS

1. Patients with pernicious anemia who require relatively little liver extract to maintain a normal blood level may relapse in as short a time as two months after liver therapy is omitted.

4. Richter, Oscar; Ivy, A. C., and Kim, M. S.: Action of Human "Pernicious Anemia Liver Extract," Proc. Soc. Exper. Biol. & Med. **29:** 1093 (June) 1932.

5. Westerbrink, H. G. K.: Ueber den Gehalt an Vitamin-B_1-freier Ernährung, Arch. neérl. de physiol. **17:** 560, 1932.

6. Leong, P. C.: Vitamin B_1 in the Animal Organism, Biochem. J. **31:** 373 (March) 1937.

7. Cabot, R. C.: Pernicious and Secondary Anemia, Chlorosis and Leukemia, in Osler, William: Modern Medicine, ed. 3, reedited by Thomas McCrae and E. H. Funk, Philadelphia, Lea & Febiger, 1927, vol. 5.

2. The majority of patients with pernicious anemia cannot be satisfactorily treated by the use of massive doses of liver extract given at intervals of several months.

3. The optimum interval between injections for most patients with pernicious anemia is from one to four weeks.

4. The difficulties involved in determining the potency of liver extracts by their maintenance effects are obvious.

DILANTIN SODIUM IN THE TREATMENT OF EPILEPSY

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ST. LOUIS

In August 1938 I began to use dilantin sodium in the treatment of epilepsy, gradually adding patients as I went along. This report concerns forty-eight cases. The patients were not selected but rather were chosen at random. They were of all ages, the etiology in all of the cases being unknown. All of these patients had received either phenobarbital or bromide or both for long periods, but the convulsions continued despite this form of medication. Various forms of diet were also tried at various times but without improvement. At the time of this writing all of the patients have the same diet. The duration of their epilepsy varied from one to thirty-one years and the frequency of convulsions from one to seventy-four a month, and many of the patients suffered from attacks of both grand and petit mal. All of the patients who were following this reaction should be expected in the cases reported, as phenobarbital and bromides had been given for almost the entire duration of the epilepsy, some receiving these sedatives for as long as thirty-one years. During the phenobarbital and bromide treatment the patients were irritable and pugnacious.

Dilantin sodium medication was started with doses of 0.1 Gm. three times a day with meals. If the doses are not taken with meals the patient is almost sure to complain of nausea. If on the initial dose the patient continued to have convulsions, the dose was increased 0.1 Gm. at a time, with one week between the increases, until the convulsions were controlled or the patient complained of toxic symptoms or showed toxic signs. The most frequent complaints of toxicity were dizziness, nausea and sometimes vomiting. The most noticeable sign was a staggering gait. The toxic signs and symptoms were more frequent in children.

Hyperplasia of the gums, as reported by Kimball,[1] was seen in thirty of our forty-eight patients. Of these thirty patients, one had extreme and six moderately advanced hyperplasia, and twenty-three showed a moderate amount. It appears that the higher the dose of the drug, the more advanced the hyperplasia. The ascorbic acid content of the blood also showed a decrease in proportion to the increase in hyperplasia.

The symptoms usually found in prolonged and severe cases of vitamin C deficiency, such as purpura, sore joints and extreme weakness, have not been seen.

Psychic disturbances were seen in five patients, but I am inclined to believe that this was brought about by the withdrawal of the sedatives. One of these patients, who remained under treatment with the drug, has been free from convulsions for four months and no longer has any psychic disturbances. The other four patients were again placed under phenobarbital therapy, and their psychic disturbances disappeared.

All of the patients now receiving dilantin sodium have been examined repeatedly both physically and with laboratory tests, and nothing pathologic could be found that was traceable to the use of this drug.

Observations in Some Noteworthy Cases

Patient	Age	Duration of Disease, Yr.	Minimum Monthly Seizures	Maximum Monthly Seizures	Daily Dose, Gm.	Result: Seizures Since Start of Dilantin Sodium Therapy	Duration of Treatment with Dilantin Sodium, Mo.	Hyperplasia	Ascorbic Acid, Mg. per 100 Cc. Blood
J. S.	27	15	3	74	0.6	Free	8	Extreme	0.137
C. F.	40	27	19	44	0.3	Free	7	None	0.627
R. S.	33	4	8	10	0.4	Free	8	None	0.586
S. C.	10	1	1	2	0.3	Free	6	None	0.520
F. B.	33	31	1	11	0.3	Free	6	Moderate	0.364
A. Y.	18	3	1	1	0.3	Free	4	None	0.344
W. W.	28	3	1	4	0.3	Free	5	Slight	0.533
G. G.	20	5	0	12	0.6	Free	4	Moderate	0.371
E. J. O.	19	18	3	11	0.4	Free	3	Slight	0.560
J. B. R.	3	2	1	6	0.4	Free	3	Slight	0.244
G. S.	35	16	1	3	0.3	Free	9	Moderate	0.204
A. T.	26	16	1	9	0.3	2*	8	Slight	0.297
C. H.	28	22	1	5	0.3	1*	5	None	0.642
P. F.	10	9	2	54	0.4	1*	9	Moderate	0.151

* Grand mal.

some form of occupation have continued to do so. All of the conditions which prevailed under the other forms of treatment were continued while they were under dilantin sodium treatment.

Of the forty-eight patients treated with this drug, nineteen, or 39 per cent, showed entire control of the convulsions, ten, or 21 per cent, showed definite alleviation, and nineteen, or 39 per cent, showed little or no benefit. Of this series of patients three have been taking this drug for less than four months.

There was considerable reaction when the phenobarbital and bromides were withdrawn, despite the fact that it was withdrawn very gradually. I believe that

From the State Hospital for Epileptics, Parsons, Kan.

REPORT OF THREE TYPICAL CASES

CASE 1.—J. S., a man aged 27, had suffered from grand mal attacks for the past fifteen years. The cause of the attacks is unknown. There had been an average of about forty attacks every month for the last five years. Immediately before

1. Kimball, O. P.: Treatment of Epilepsy with Sodium Diphenyl Hydantoinate, J. A. M. A. **112**: 1244 (April 1) 1939.

the start of the treatment with dilantin sodium he had from one to four seizures every day. Sept. 8, 1938, a dose larger than I generally use was instituted because of the severity of involvement. The last seizure occurred September 9. While he was taking phenobarbital he was one of our meanest patients; he would cause fights, refuse to work and destroy property. Now he works steadily, is one of our best behaved patients and helps the attendants to quell fights. This change in personality is certainly something that one may look forward to in the future treatment of epilepsy with dilantin sodium. There was extreme hyperplasia of the gums. The ascorbic acid content was 0.137 mg. per hundred cubic centimeters of blood. This patient did not have much of a reaction when the phenobarbital was withdrawn. He has been free from seizures for nine months.

CASE 2.—C. F., a man aged 40, had his first attacks of grand mal at the age of 13. The seizures followed scarlet fever. He has had from two to as many as forty-four attacks a month. He had been on phenobarbital for about twenty years. Oct. 5, 1939, he was placed under medication with 0.3 Gm. of dilantin sodium a day and one-half grain (0.03 Gm.) of phenobarbital was withdrawn every day. Convulsions became more frequent and more severe, and October 8 I increased the dose to 0.4 Gm. daily. He continued to have seizures, but they seemed to be less intense and not as frequent. October 12 I increased the dose to 0.5 Gm. daily. During this period he complained of being very nervous, which I attribute to the withdrawal of the phenobarbital. November 9 he complained of various "funny feelings" and I added sodium bromide 5 grains (0.3 Gm.) four times a day. He continued to take the bromide along with dilantin sodium for one month, when the bromide was gradually withdrawn. In April 1939 he complained of nausea and dizziness. I immediately withdrew 0.2 Gm. of dilantin sodium from his daily dose, leaving 0.3 Gm., which up to this time seems to control the seizures. He has been free from convulsions for the last eight months.

CASE 3.—J. B. R., a girl aged 3 years, had been suffering from attacks of grand mal and petit mal for two years. There is a history of injury at birth, but examination so far has failed to reveal such a cause or any other possible cause for the epilepsy. She had been taking phenobarbital, but this did not control the convulsions. She had from one to six attacks of grand mal and from two to nine attacks of petit mal every month. Sept. 5, 1938, she was placed on a ketogenic diet. From October 17 until December 11 she had a definite state of ketosis. During this time she had eighteen attacks of grand mal and eight attacks of petit mal. December 18 the ketogenic diet was discontinued in the usual manner and the child had six grand mal attacks from Dec. 18, 1938, to Jan. 15, 1939. Starting on January 15 0.15 Gm. of dilantin sodium was given. She continued to have attacks, and the dose was increased to 0.3 Gm. From March 26, 1939, until the time of writing, a period of ninety days, she has had but one petit mal seizure, on May 15. During the treatment with dilantin sodium she has at times complained of nausea and shown an unsteady gait. She has a moderate degree of hyperplasia of the gums. The ascorbic acid content of the blood is 0.244 mg. per hundred cubic centimeters.

CONCLUSIONS

1. Dilantin sodium, besides being an effective anticonvulsant, has the advantage of not producing the sedative effect of the other anticonvulsants.

2. The personality of the epileptic patient treated with dilantin sodium is remarkably improved.

3. The deficiency in ascorbic acid content parallels to a certain degree the amount of hyperplasia of the gums.

4. Dilantin sodium has a very definite place in the treatment of epilepsy.

Further studies are being made, and their results will be reported at a later date.

2302a South Ninth Street.

SYPHILIS CASE FINDING IN INDUSTRY

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The importance of case finding in syphilis has a parallel in tuberculosis, since these diseases have many things in common from a social and an economic point of view. They have their greatest incidence in the low income groups and among the uneducated, and for these two reasons the problem of control and eradication is all the more difficult. The steady decline of the death rate from tuberculosis marks the success of control measures of that disease; the number of deaths has decreased in direct proportion to the intensity of the antituberculosis work. It is known that syphilis can also be controlled, as the Scandinavian countries have given the world an excellent example of the effects of concerted effort to eradicate the menace of venereal diseases. It is fortunate that we have the example of the result of their experience in our present campaign.

The social and economic aspects of tuberculosis have long been recognized, and a systematized method of control has been worked out and applied fairly well throughout this country. There exist hospitals, dispensaries and personnel for case finding, diagnosis, treatment, education and rehabilitation, which are the well known methods employed in tuberculosis control campaigns. The results of the tuberculosis program are well known to all.

Most of the principles of the control programs in tuberculosis can be applied to the control of syphilis. Both are infectious diseases and therefore it is important to find the early infectious case, make proper diagnosis and isolate or quarantine until the infectious period is past. In the case of syphilis, the quarantine period can be made short by treatment. Patients are soon rendered noninfectious and are no longer a menace. Dr. Parran calls this "chemical quarantine." After the quarantine period, the cases of both tuberculosis and syphilis must be kept under treatment until they are past the period where relapses and serious complications might result in early death. This brings in the necessity of case holding, which is one of the difficulties in both instances.

The annual attack rate of syphilis per hundred thousand of population in the United States in 1935 was 796 compared with 47 in Great Britain (clinics only), 20 in Denmark and 7 in Sweden. In other words, there were proportionately more than a hundred times as many new cases of syphilis in the United States as there were in Sweden that year, as shown in figure 1. This demonstrates two things: First, syphilis can be controlled and, second, persons with infectious syphilis in this country are not being found, isolated and prevented from spreading the disease to others.

Much of the foregoing material deals with the infectious cases and the spread of syphilis. There is another group which is larger and presents serious problems. This group includes the cases of syphilis which have passed the infectious stages; it is from their ranks that

Read before the Second Annual Congress on Industrial Health, Chicago, Jan. 15, 1940.

the recruits are derived for the tragic late manifestations of this disease. The seriousness of any one of these conditions, it seems, more than amply justifies our program of finding these cases. You, as physicians, know that when patients pass through the early stages of syphilis they are unaware of the seriousness of their condition and need guidance and advice to effect a cure of the disease before some of the serious complications become evident. It has been estimated that there are more than 40,000 deaths annually from cardiovascular syphilis, which is more than half as many as there are from tuberculosis. One of each ten persons admitted to the insane hospitals has dementia paralytica, and their domiciliary care costs over $31,000,000 annually. Another $10,000,000 is spent each year for pensions and care of the syphilitic blind. Before the advent of the national campaign for the control of syphilis there were more than 60,000 syphilitic babies born each year in the United States, one third of whom, if untreated, will become either totally or partially blind.

"Syphilis," Surgeon General Thomas Parran says, "is now a major hazard to health and efficiency. Efforts to improve industrial hygiene must include more attention to syphilis control among workers. If each industry will take responsibility for knowing its own problem, for seeing that treatment is available, for continuing to give employment to those who seek a cure, the cost to the industry will be paid promptly in terms of reduced sickness losses and more efficient labor. The employees, their families and the community will benefit."

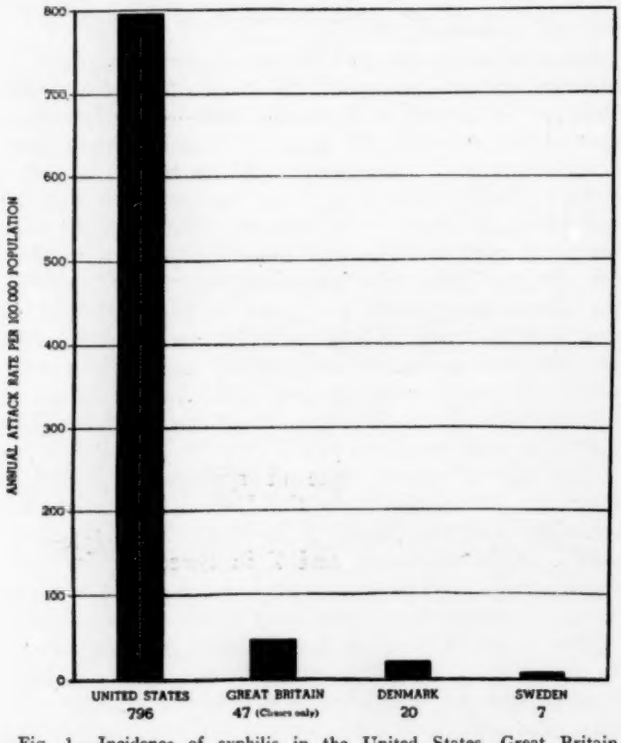

Fig. 1.—Incidence of syphilis in the United States, Great Britain, Denmark and Sweden in 1935.

To discharge persons with syphilis, thereby denying them the right of an income, places a great burden on the worker, the community and the nation. The worker with syphilis needs an income to pay for the necessary treatment and he also needs the friendly advice and counsel of the plant physician. Without these requisites he does not receive the necessary measures to cure his disease and in time, together with members of his family, he will most likely become a public charge. Industry will pay for such cases of syphilis in added taxes.

The further importance of syphilis control in industry is evident when it is realized that there are more than

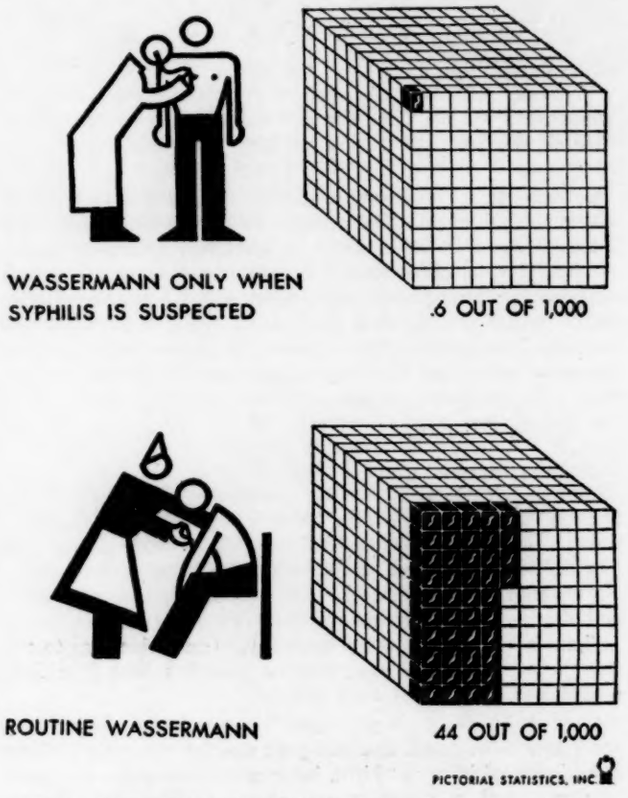

Fig. 2.—Why routine tests should be given. Figures from the American Social Hygiene Association.

15 million people employed in the mining, mechanical and metal trades. A syphilis program reaching these workers and members of their families will include about half of the population of the country.

The industrial syphilis control program, therefore, is an integral part of the whole national campaign. It is important from the point of view of the large number of persons involved and because of its function as part of the community control program, and also because the employees and employers working together harmoniously will influence greatly the direction and the progress of this campaign in every community throughout the nation.

The program recommended by the U. S. Public Health Service is one of case finding, treatment and education. It has worked out well in the industries which have engaged in syphilis control programs and has been met with enthusiastic response by manufacturers, union officials and employees. Experience has shown that it must be carried out on a cooperative and impartial basis in order to be successful.

The cooperative program for syphilis control in industry recommended by the Surgeon General of the United States Public Health Service is as follows:

1. Routine blood tests should be made on all employees at times of reexamination.

2. Routine blood tests should be made on all applicants for employment.

3. Patients with syphilis, if noninfectious, should be kept in employment and also accepted for work provided they agree to take the necessary treatment for syphilis. Those refusing treatment must be referred to the local health departments.

4. All persons with syphilis found by blood testing should be referred to the family physician for confirmation of the diagnosis and for treatment of the disease. If the worker is unable to pay for this service, he should be referred to clinics where diagnosis and treatment are available.

5. Strict confidence must be maintained between the plant physician and the worker regarding his condition.

6. Cases should be followed up by the plant physician and his staff to assure that the patient continues treatment and that adequate treatment is being received. If facilities are available, health departments may assist in the follow-up of cases.

7. An educational program should be developed which will teach the employees the facts about venereal diseases, how they are contracted, how they are spread and how they may be cured. The educational program should include information concerning prophylaxis.

In the program of case finding in industry, we are also concerned with promoting efficiency and the prevention of accidents. The interest of industry in the health of the worker has proved that it pays dividends in more than one way. As regards syphilis, the patients are better workers if their disease is treated, they change

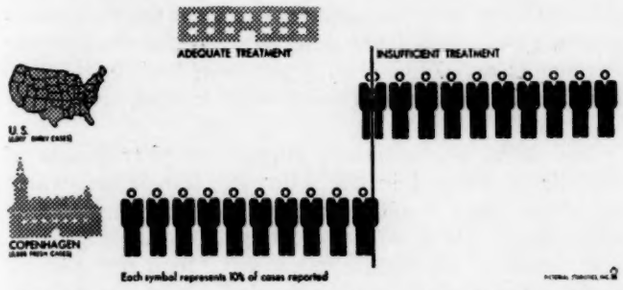

Fig. 3.—Completeness of treatment in the United States and in Copenhagen.

jobs less often and have fewer accidents. The hospital, legal and compensation costs are less.

The application of this program can be varied according to the local needs. In our experience, we have used several methods. In some cases the local health officer has taken the initiative and industry has cooperated. In others, the industry has taken the initiative and the health officer has cooperated. In such cases there is usually no full time plant physician. In other instances the workers have taken the lead in educational work and in inducing their fellow workers to consent to have blood tests made, the plant taking the blood for testing and doing the follow-up on treatment. In none of the plants cooperating with the U. S. Public Health Service are patients treated, but all are referred to their family physicians. When the income is low and the financial responsibility of a large family is great the patients are referred to the clinics where adequate treatment can be had.

On the whole, these methods have worked out well. The program has not been without difficulty in a few instances. One of these has been that the worker is afraid of losing his job. All of the industries cooperating, I believe, are acting in good faith with their workers. It has been necessary to do some educational work on the employer as well as the employee. Many employers thought that all syphilitic persons were infectious and that they should be avoided, as in the case of leprosy. One manufacturer was happy to know differently and showed remorse over the injustice he had done in the past by discharging employees with syphilis. He said he would reemploy them as fast as possible and that no other patients, except those with

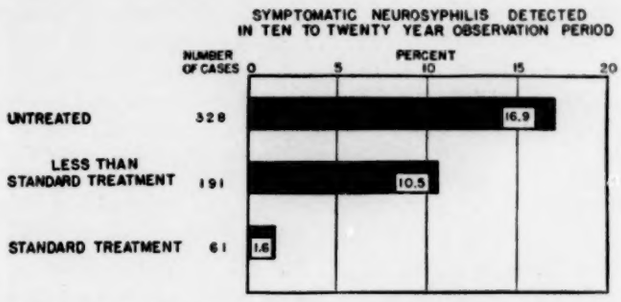

Fig. 4.—Probability of developing symptomatic neurosyphilis in treated and untreated syphilis.

infectious and cerebral involvement, would be discharged. The popular education on syphilis by the newspapers, magazines and radio has practically eliminated all this difficulty.

The nature of the disease syphilis makes it rather difficult to find the patients and to keep them under treatment long enough to effect a cure. There is no pain associated with the early stages in syphilis as there is in many diseases, and for this reason many infected persons do not realize the seriousness of their affliction. The disease passes through the first stages and becomes latent, usually without painful symptoms or inconvenience, and it is easily overlooked by ordinary physical examination without blood tests. The American Social Hygiene Society has presented some interesting data relative to case finding by routine blood tests. They showed that in the course of physical examinations where blood tests were made only when syphilis was suspected, 0.6 (six-tenths, or less than one) case was found per thousand compared with forty-four in 1,000 when routine blood tests were made. The ratio is about 1 to 73. This emphasizes the difficulty encountered in

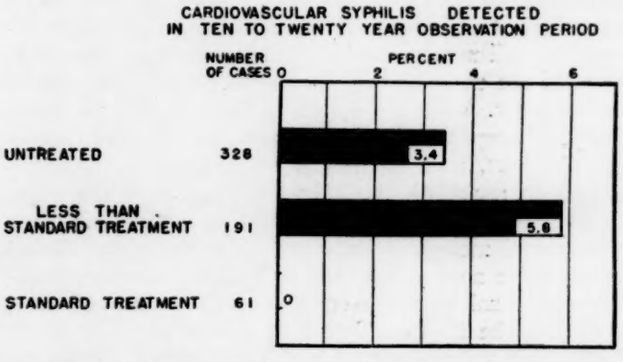

Fig. 5.—Probability of developing cardiovascular syphilis in treated and untreated syphilis.

attempting the diagnosis of syphilis by physical examination alone (fig. 2).

The case finding projects sponsored by the Public Health Service in cooperation with industries and the state and local health departments have not been completed. The process of blood testing is going ahead with routine examinations and time is required before all workers in the cooperating plants will be given tests.

For this reason, I am unable to present completed figures as to the incidence of syphilis among industrial workers. However, information is available in certain industries and seems to bear out the previous statements about the greatest incidence of syphilis being found in the lower income groups. An industry near Chicago has completed over 10,000 blood tests and found that 5 per cent of the workers had positive tests. A group of industries in Chicago has completed tests totaling more than 66,000, with 3 per cent positive. In Cincinnati 5,768 workers in various industries were given blood tests and 2.75 per cent were found positive. A single industry in Wisconsin employing skilled workers had 0.5 per cent (one half of 1 per cent) positive. Preliminary reports from a railway surgeon indicate that 4.7 per cent of a group of 10,000 railway workers have positive blood tests. An industrial physician in Milwaukee examining for many small industries found 4 per cent positive blood tests in 16,000 routine examinations. We expect in time to have the results of more of these case finding projects completed, and a more accurate picture of the incidence of syphilis in industrial workers will be available.

The importance of treatment in the prevention and spread of syphilis cannot be overestimated, it has such deep social and economic significance. Fortunately, treatment soon renders a patient noninfectious. The treatment of syphilis is necessarily long and expensive, and when a patient feels good it is difficult to have him return to the physician weekly for about a year and a half. Yet it is known that unless he completes treatment he will not be sure of escaping the late manifestations of the disease, such as heart and nervous system involvement. With the female patient there is the likelihood of pregnancies and the birth of syphilitic babies or abortions, and all this is in addition to the possibility of the same late manifestations as in the male.

Amount of Treatment in 6,807 Cases of Early Syphilis Before Lapse from Treatment or Discharge

Arsenical Injections with Interim Heavy Metal	Number	Per Cent
Less than 10 injections	4,077	59.9
From 10 to 19 injections	1,641	24.1
From 20 to 29 injections	749	11.0
From 30 to 39 injections	245	3.6
Injections numbering 40 or more	95	1.4
Total	6,807	100.0

Based on total cases of early syphilis treated by the five cooperating clinics (Ven. Dis. Inform. **15**: 341 [Nov.] 1934).

Intensive programs of case holding coordinated with educational measures will tend to decrease the spread of infection and reduce the injurious consequences to the individual and the costs to society from general neglect of the disease. Case holding is vital to the public health and the program for the control of the disease in these early days immediately following infection.

The services of the follow-up nurses of the state and local health departments are available to private physicians in a number of places. When a patient lapses from treatment the physician can notify the health department, and the nurse will visit the patient and attempt to have him return to the physician for further treatment.

The nurse engaged in follow-up work of syphilis cases must impress on the patient that he has a dangerous disease. If this is done successfully, the continuation of treatment will be made easier. The mildness of the early stages of the disease and the lack of much pain associated with it make the problem of keeping the patient under treatment even greater. From the standpoint of treatment it is unfortunate that no more pain or annoying symptoms are associated with early syphilis. If such were the case, it would simplify the matter greatly. Extensive treatment over a period of many months is quite an undertaking and in many cases an expensive one. There may be need for certain adjustments in the life of the patient, and here is where the follow-up nurse is of great help. As a rule, the response made by the patient depends on the adequacy of the nurse in being able to instruct him about his disease.

Syphilis, as you know, is one of the few diseases for which there is a specific remedy. If treated early it can be cured and if treated later in its course it can be arrested. This sounds as if the cure of syphilis were a simple matter. It would be simple if every one knew the end results of the disease as well as most physicians, nurses and social workers. If syphilis were a more painful disease and there existed the necessity for relief from pain, it would simplify the problem of keeping patients under treatment until they were cured.

A study of 6,807 patients with early syphilis showed that 4,077, or 59.9 per cent, received less than ten treatments, 1,641, or 24.1 per cent, received less than twenty treatments and 749, or 11.0 per cent, less than thirty, and that 1.4 per cent received forty or more treatments (fig. 3).

The social and economic importance of treatment of syphilis is stressed in the following statements, which show the tragic results of neglect of treatment or of its inadequacy. Of a series of 590 patients with syphilis, 328 received inadequate treatment, 16.9 per cent of them contracted neurosyphilis and 3.4 per cent contracted cardiovascular syphilis. Of this group 191 received less than standard treatment; 10.5 per cent of them contracted neurosyphilis and 5.8 per cent contracted cardiovascular syphilis. Of the remaining sixty-one patients 1.6 per cent contracted neurosyphilis and none had cardiovascular involvement (figs. 4 and 5).

SUMMARY

Syphilis, like tuberculosis, presents a social and economic problem. Finding the early infectious cases and treating them prevent the spread of the disease. The finding and treatment of cases which have passed the infectious stage prevent the tragic manifestations of late syphilis.

There are over 15 million people in the mining, metal and manufacturing trades in the United States. A syphilis program which will include this group and members of their families would reach about half of the people of this country.

Industry, the workers, the health officer and practicing physicians must work together in syphilis programs for industry, the first groups to find the cases and the physicians to give adequate treatment.

Education concerning venereal diseases should be a part of every health education program. Without education, we cannot conquer syphilis.

The elimination of syphilis from industrial workers will prolong their lives and make them better producers and a happier group of people.

BENZENE POISONING

REPORT OF CASE WITH STERNAL MARROW STUDIES, AUTOHEMAGGLUTINATION AND AUTOPSY

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Benzene (benzol, C_6H_6) is commonly used in industrial processes as a solvent, as a fuel, and in the manufacture of drugs and dyes. The recognition of benzene as an industrial hazard dates from the observation of Santesson [1] in 1897. This author reported a series of fatal cases of purpura in women employed in a bicycle factory in Uppsala, Sweden, where benzene was used as a solvent for rubber. After his clinical observations, Santesson produced chronic poisoning in rabbits both by injecting benzene subcutaneously and by wrapping the animals in cloth soaked with benzene. He found hemorrhages in the pleura, lungs and pericardium, and in the mucosa of the stomach and intestine. In 1900 he [2] succeeded in producing a marked degree of fatty degeneration of the organs of rabbits and concluded that benzene was the toxic agent.

At about this time in America Selling [3] reported his observations on a group of three cases of purpura haemorrhagica occurring in young girls (14 years of age) who were exposed to benzene in the "coating room" of a tin can factory. Two of the three died. At autopsy the bone marrow from the femur of one showed very few cells. The predominant cells were normal red blood cells. The total number of leukocytes was greatly reduced, and on smear the majority were lymphocytes. The nuclei showed vacuolation, and the cytoplasm was thin, fragile and poorly stained. One megalokaryocyte was seen on careful examination of the cover slip. The bone marrow in the second case resembled closely that in the first, except that the reduction in the cellular elements had not reached quite so low a level.

Chronic poisoning results from the inhalation of benzene in industries in which it is used as a solvent and evaporates into the air of the workroom. Hemopoietic insufficiency, varying from mild anemia to complete aplasia which is incompatible with life, may result from such exposure.

We believe that the following case report of benzene poisoning is of interest because of observations on sternal marrow obtained by puncture ante mortem, the occurrence of autohemagglutination and the results of postmortem examination.

REPORT OF CASE

History.—J. K., a white man aged 43, admitted to the hospital March 30, 1938, had been employed as a pressman for twenty-five years. Until October 1937 he had worked only on black and white presses. Since that date he had worked on multicolored presses. In this line of duty he was exposed to a variety of colored inks and inhaled fumes of benzene. The concentration of benzene vapors in the workroom air ranged from 50 to 740 parts per million parts of air. Approximately three and a half months after he had entered his new occupation he noticed a bluish blotch on his right thigh and had attacks of vomiting. He thought the black and blue mark was traumatic in origin and paid no attention to it. After several days the blotch disappeared. Following this, blue and red spots appeared on his left thigh and over his chest; bleeding from the nose occurred about four weeks before admission and recurred at frequent intervals. At about the same time he noted bleeding of the gums, weakness, loss of weight and loss of strength. Three weeks later he sustained a mild injury to the right arm and forearm. Large areas of discoloration appeared at the traumatic sites. Several days before he was admitted to the hospital he had bleeding from the rectum which lasted about two days. Three days prior to admission he complained of a sore throat, difficulty in swallowing and a swelling behind the right jaw. Aside from the occupational history noted, the past history was noncontributory.

Physical Examination.—The patient was well oriented and cooperative, in poor general physical condition and appearing acutely ill. The temperature was 104 F., the weight was 174 pounds (79 Kg.) and the blood pressure 126 systolic, 84 diastolic. The pulse rate was 124. There was a swelling about the size of an orange at the angle of the right mandible extending downward over the soft parts of the neck. The area was tender but did not present any evidences of infection. The patient had marked pallor, a foul breath from the mouth and extensive subcutaneous hemorrhages over practically the entire body. There was an extensive hemorrhagic area over the right half of both the hard and the soft palate. The right tonsil was covered by a necrotic exudate, and the peritonsillar area was markedly injected. The uvula was edematous and the gingival mucous membranes bled easily on manipulation. There was an extensive hematoma of the left buttock extending from the trochanter of the femur to the anus. This area was tender to touch and fluctuated. On rectal examination a large thrombotic hemorrhoid was noted at the posterior commissure. There were no ulcerations of the lower part of the rectal mucous membrane. The remainder of the physical examination gave essentially negative results.

TABLE 1.—*Urinary Sulfate Values*

Urinary Sulfate	4/2/38	4/7/38
Total sulfate	1.96 Gm.	3.32 Gm.
Inorganic sulfate	1.865 Gm.	3.22 Gm.
Percentage of inorganic sulfate	95%	97%

Laboratory Data.—The blood Wassermann reaction was negative. The nonprotein nitrogen determination was 53.5 mg. in 100 cc. of blood, total protein 4.92 Gm. in 100 cc. of serum, albumin 2.8 Gm. in 100 cc. of serum, globulin 2.12 Gm. in 100 cc. of serum and blood plasma fibrinogen 0.591 Gm. in 100 cc. of plasma. The bleeding time was two and one-half minutes and the coagulation time three and one-half minutes. Repeated blood cultures were sterile. Urine studies on several occasions showed acid reaction, specific gravity ranging from 1.012 to 1.030, no sugar and some albumin (1 plus). On microscopic examination one noted occasional granular casts. There were no red blood cells visible. Repeated examinations for Bence Jones protein yielded negative results. A smear of the throat exudate showed no Vincent organisms. X-ray study of the skull and long bones failed to reveal evidence of any abnormalities of the bony structure. Urinary sulfate determinations are shown in table 1.

Bone Marrow and Peripheral Blood Studies.—Bone marrow aspiration was done on March 31 according to the technic of Morrison and Samwick [4] as follows: The skin at the sternomanubrial junction was prepared with iodine and alcohol as for any surgical procedure. An 18 gage steel needle 2 inches

From the Department of Medicine and the Department of Pathology, Jewish Hospital.

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2. Santesson, C. G.: Beobachtungen über Benzolvergiftung besonders mit Rucksicht aus das Verhalten des Fettes im Organismus, Skandinav. Arch. f. Physiol. **10**: 1, 1900.

3. Selling, L.: A Preliminary Report of Some Cases of Purpura Hemorrhagica Due to Benzol Poisoning, Bull. Johns Hopkins Hosp. **21**: 33, 1910.

4. Morrison, Maurice, and Samwick, A. A.: A Simple Method of Bone Marrow Aspiration, J. Lab. & Clin. Med. **24**: 858 (May) 1939.

in length, fitted with an obturator, was plunged through the skin at the midpoint of the sternum just below the sternomanubrial junction. A sudden give indicated that the bone marrow cavity had been entered. The obturator was removed from the needle and a 5 cc. syringe was attached. A minimal amount of bone marrow (from one to three drops) was drawn up into the syringe. The needle was removed and the contents

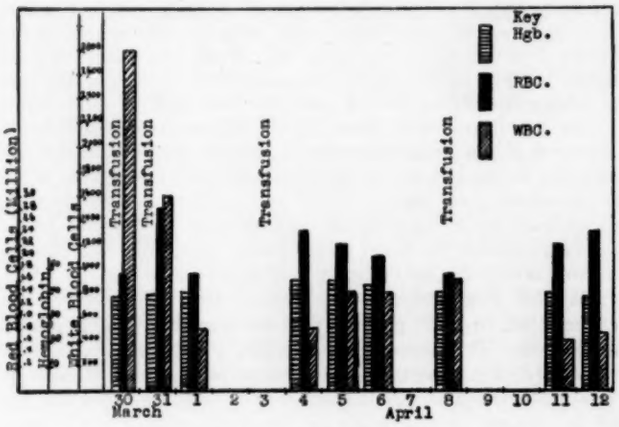

Fig. 1.—Blood counts.

of the syringe were ejected on clean slides. Thin smears were made. At the same time smears of peripheral blood were prepared. All were stained by the usual method, and the cells were studied. The results of the sternal marrow studies (reported by Dr. M. Morrison) are shown in table 2.

The lymphocytes were not degenerated.

A smear of the peripheral blood was made at the same time. Only ten cells were counted; all were mature lymphocytes in good morphologic condition. No evidence of degeneration was noted. No polymorphonuclear leukocytes or other myeloid elements were seen. The platelets were diminished to zero. Slight anisocytosis, poikilocytosis and macrocytosis were present. In summary, the main features were (1) shift to the left of white blood cells (2 plus); (2) erythrogenesis diminished (evidence of aplasia); (3) erythrogenetic series, maturation defect not

TABLE 2.—*Composition of Sternal Marrow*

Number of Cells		Bone Marrow Ratios	
Myeloblasts	12	Granulocyte : lobocyte	66:34
Myelocytes	38	Early : late erythroblast	0:100
Eosinophilic myelocytes	2	Myeloid : smudge	58:42
Metamyelocytes	10	Myeloid : reticulum	85:15
Staff cells	4	Granulocytes : erythroid	94:4
Polymorphonuclears	8	Myeloid : plasma	65:35
Eosinophils	26	Myeloid : lymphocyte	85:15
		Megakaryocyte, less than	2/1,000

discernible; (4) increase in plasma cells (3 plus); (5) degeneration of myeloid elements (3 plus).

Course in the Hospital.—The throat improved and the edema of the uvula and soft palate gradually subsided. The hemorrhagic area over the right side of the palate began to disappear. The ecchymotic areas on the arms, chest and buttocks became less pronounced. However, the patient still continued to complain of profound weakness.

On April 8, bleeding was noted from the gum margins and a large clot was removed from an ulcerated area over the right tonsillar fossa. A continuous slow, serosanguineous ooze from the base of the ulcer was noted. The possibility of erosion of a small vessel was considered, but because of the poor condition of the patient no attempts were made at ligation.

Direct transfusions of whole blood were given as follows: March 30, 300 cc.; March 31, 300 cc.; April 3, 350 cc., and April 8, 500 cc., as indicated in figure 1. In spite of these measures, the hemoglobin continued to fall. There were persistent severe anemia and leukopenia. Repeated blood smears showed a diminution in the granular elements of the blood. The polymorphonuclear leukocytes fell as low as 3 per cent (table 3). The temperature ranged from 99 to 104 F. Bleeding from the gums continued. The patient's condition grew progressively worse, and he died on April 12, fourteen days after admission to the hospital.

Postmortem Observations.—Autopsy was performed on April 13, seventeen hours after death.

Gross Examination: The body was well developed and well nourished. There were purple ecchymotic areas over both

TABLE 3.—*Blood Studies* *

Date	White Blood Cells	Polymorphonuclears	Band Cells	Lymphocytes	Monocytes	Eosinophils	Myelocytes	Myeloblasts	Macrophages
3/31	1,600	11	..	83	5	1	..	..	..
4/ 1	500	14	..	85	1	..	..	..	..
4/ 4	500	16	..	82	2	..	..	..	..
4/ 5	800	26	..	74	..	..	..	..	..
4/ 6	800	6	2	82	6	..	..	..	..
4/ 8	900	18	18	62	2	..	..	..	..
4/11	400	8	..	90	2	..	..	..	..
4/12	550	3	..	85	..	..	3	1	5

* Note the paucity of the granular types of white blood cells. The figures represent the percentage after a total of 100 cells were counted.

antecubital regions, over the left side of the chest in the anterior axillary line between the third and fifth ribs, just above the right thenar region, on the anterior surfaces of both tibias and on the dorsal surfaces of both feet. The surface of the lower lateral half of the left leg was edematous, purple and indurated. The lymph nodes externally were not palpable. The conjunctivas and scleras were pale. The corneas were clear. The lips and buccal mucosa were pale blue.

The peritoneal cavity contained no free fluid, and its surface was smooth, glistening and pale. The edge of the liver pro-

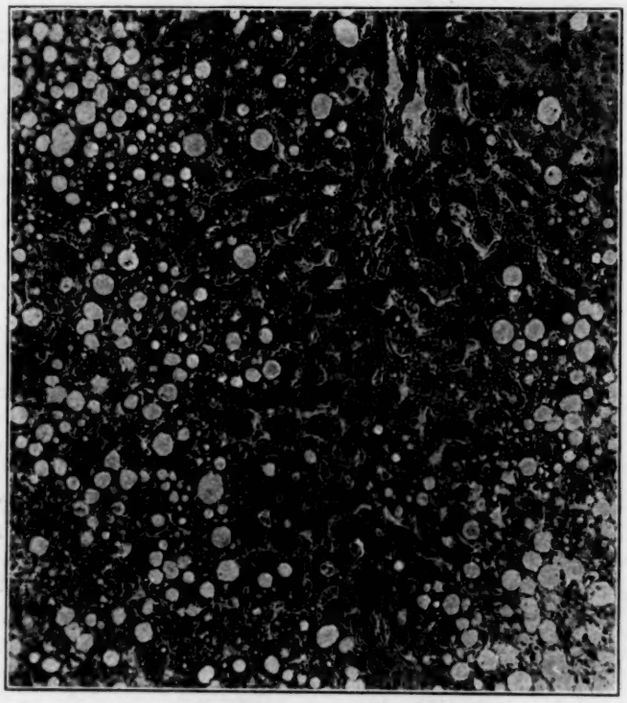

Fig. 2.—Liver, showing fatty changes; × 160.

truded 2 cm. below the xiphoid process. The pericardial cavity contained 60 cc. of clear yellow fluid. The tongue, the inferior portion of the pharynx and the larynx were normal. The thyroid weighed 40 Gm. The lymph nodes and blood vessels of the neck were not unusual.

The heart measured 12 cm. from apex to base. The epicardium was smooth and glistening. There was an abundance of subepicardial adipose tissue. The coronary arteries were normal. The myocardium was pale brown. The weight of the

heart was 430 Gm. The aorta was normal. There were a few small soft yellow plaques on the intimal surfaces.

The trachea was pale gray, smooth and glistening. The bronchial mucosa was injected. The right and left lungs weighed 520 and 470 Gm. respectively. The pleural surfaces were smooth and glistening. There were numerous petechiae on the visceral and parietal pleura.

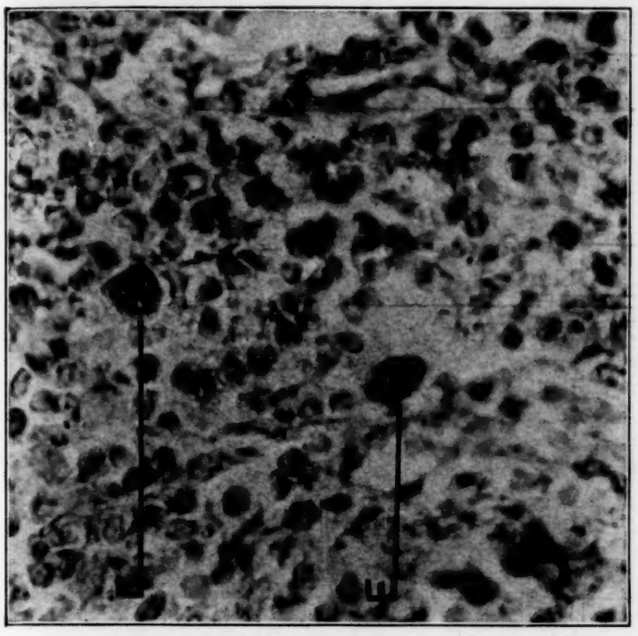

Fig. 3.—Spleen, showing pulpar hyperplasia. Note two large cells, erythroblasts, in the center; × 950.

The tracheobronchial nodes were small.

The esophagus was smooth and pale gray. The stomach was dilated. The mucosa was thrown into high longitudinal folds and there were numerous petechiae in the pars media of the gastric mucosa. The mucosa of the distal half of the large intestine was dark gray-brown. There were numerous small varices in the rectum.

The liver measured 32 by 19 by 10 cm. and weighed 2,590 Gm. Its surface was smooth, glistening and pale brown. The cut surfaces were pale brown tinged with yellow. The lobular architecture was distinct. The consistency on section was increased. The gallbladder measured 4 by 3 by 1.5 cm. The serosal surface was yellow-gray and smooth. The wall was slightly thickened. The mucosal pattern was distinct. The pancreas weighed 95 Gm. The lobules were of normal size and appearance. The right and left suprarenal glands weighed 10 and 11 Gm. respectively.

Each kidney weighed 220 Gm. The capsules were thin and glistening. Occasional subcapsular petechiae were seen in both kidneys. The cortex was pale brown streaked with red. The pelves and ureters appeared normal. The mucosa of the urinary bladder was pale.

The spleen measured 14 by 8 by 4 cm. and weighed 180 Gm. The external surface was slightly wrinkled and gray-blue. The cut surfaces were dark red and brown; the malpighian corpuscles were distinct. The fibrous markings were delicate and the pulp could not be scraped off. The lymph nodes were small and the cut surfaces were red. The bone marrow was red and the trabeculae were not thickened. A section through the anterior portion of the left tibia was normal.

The brain weighed 1,520 Gm. The meninges were not unusual. The pia arachnoidal vessels were congested. The basilar artery and its branches showed an occasional small firm plaque. The gyri were somewhat flattened. The pituitary gland appeared normal.

Microscopic Examination: Thyroid Gland. The acini varied in size and contained deep pink fragmented colloid. They were lined by regular cuboidal cells. The poorly defined lobules were separated by narrow septums of hyalinizing fibrous connective tissue. Between the acini there were numerous capillaries distended with blood.

Heart. In a section through the left ventricle the epicardium was not unusual. The subepicardial adipose tissue was abundant. The adventitia and media of the coronary arteries were thin; the internal elastica was broad and frayed. The intima was thick and composed of spindle shaped cells. The myocardial fibers and their nuclei were not unusual. In areas the myocardial fibers were separated by loose strands of connective tissue. Some of the smaller vessels were filled with collections of small round cells. The vessel walls were thin and appeared somewhat hyalinized.

Lungs. In a section through the left lung the pleura was of the usual width. The alveoli were irregular in size and shape. Some of the alveoli were broad, others were narrow. The interalveolar septums were delicate; many were incomplete or absent. Several of the alveoli contained an occasional mononuclear cell. The lumens of the bronchioles were empty.

Liver. The general architecture of the organ was somewhat abnormal, the normal arrangement of the lobules being disturbed. The cords were irregular in their outlines. The cells were swollen and varied considerably in size and shape. Those in the center of the lobules contained many small and a few very large vacuoles (fig. 2). The protoplasm was deeply eosinophilic and granular. The nuclei were mostly small and vesicular. The sinuses were narrow and for the most part empty. The Kupffer cells were distinct. In the periportal connective tissue a few small round cells were seen. No areas of hemopoiesis or bile pigment collections were seen.

Pancreas. The arrangement of the acini into lobules was orderly. The connective tissue septums were delicate. The islands of Langerhans were of fairly good size. The epithelium

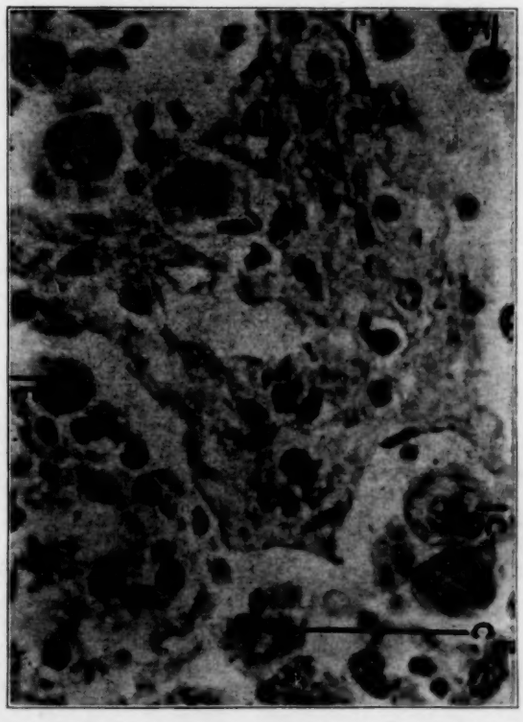

Fig. 4.—Mediastinal lymph node, showing erythrophagocytosis (*C*), pulpar hyperplasia and erythroblasts (*E*); × 950.

of the ducts was well preserved. Within the lobules, many adipose tissue cells were seen.

Suprarenal Glands. The arrangement of the cell layers in the cortex was orderly. Many of the cells were vacuolated, shredded and foamy. The cortical cell groups were separated by narrow and wide spaces filled with red blood cells. In one area of the cortex the cells were displaced by a collection of red blood cells and rusty brown granular pigment. Most of the nuclei stained well. The medullary cells were fairly abun-

dant but distorted. The cytoplasm stained lavender and was granular. The borders were indistinct. The nuclei stained well. Several small areas of cortical cell layers were surrounded by delicate connective tissue capsules. In another preparation the medullary tissue was abundant.

Kidneys. The capsule was delicate. The glomeruli were of good size and distribution. The capillary loops were somewhat distended. The subcapsular space was of the usual width. Bowman's capsule was slightly thickened. The epithelium of the convoluted and collecting tubules was poorly preserved. The cell borders were indistinct; the cytoplasm was granular. The nuclei stained well. The lumens were of good size and contained granular material. The capillaries in the medulla were distended with blood. The pelves in the sections from the left and the right kidney showed blood and loose epithelial cells. In a section from the left kidney there was a mass of blue-staining amorphous material which filled the distended lumen of one of the collecting tubules. The walls of the arteries disclosed a slight subintimal thickening. One of the smaller blood vessels was filled with pink stained amorphous material and a few irregular dark blue stained cells.

Prostate Gland. The acini varied in size. They were lined by well preserved cylindric and cuboidal cells with frequent infoldings. They were separated from one another by a dense fibromuscular stroma. The lumens contained pink amorphous material and many corpora amylacea.

Spleen. The architecture of the organ was well maintained. Only a few lymph follicles could be identified and these were very small. They consisted of the follicular artery surrounded by a few small round cells and an occasional large round cell. No germinal centers were recognizable. The site of former lymph follicles could be identified by the remaining central artery and some round cells. Scattered throughout the margins of the lymph follicles and the surrounding pulp were small collections of mononuclear cells, with reticulated nuclei and abundant dark staining protoplasm, which closely resembled

Fig. 5.—Bone marrow from vertebra, showing the only area found with some evidence of activity; × 160.

erythroblasts (fig. 3). Some had cytoplasm which stained pink. A few large cells with deeply staining pink protoplasm and from two to four, or occasionally more, deep blue staining nuclei were found. These areas are very suggestive of islands of hemopoiesis. In the dense pulpar areas the sinus walls were thick and made up of spindle cells, with pale staining protoplasm and oval vesicular nuclei. The capsule, trabeculae and blood vessels showed no unusual changes.

Lymph Nodes. Lymph nodes from the mediastinum and abdomen showed a normal architecture. The follicles showed no unusual features. In the pulp, many of the sinuses were greatly dilated, the walls were thin and were composed of a single layer of endothelial cells. The sinuses were occupied by many erythrocytes (fig. 4), a few mononuclear cells with scanty

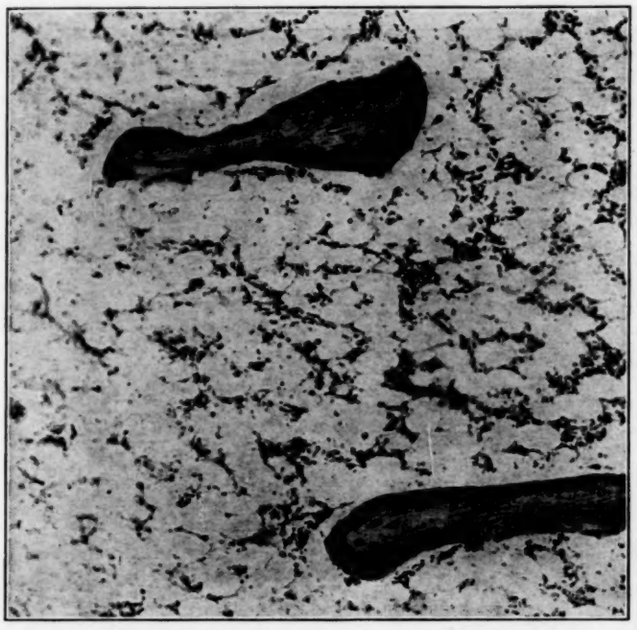

Fig. 6.—Bone marrow from vertebra; marked hypoplasia; × 160.

cytoplasm and very few polymorphonuclear cells. Many very large mononuclears dominated the picture. These cells contained a clear protoplasm and a small, compact, deeply blue staining nucleus. Some were polygonal while others were round. Most contained from one to several red cells in various stages of degeneration. In others the protoplasm stained a diffuse pink, resembling the color of hemoglobin. Some contained many rust colored irregularly shaped pigment granules. No evidence of hemopoiesis was found.

Bone Marrow. Sections of the marrow from the vertebra, tibia and rib showed similar pictures. The bony construction was not unusual. The medullary tissue consisted almost exclusively of adipose tissue cells with a delicate connective tissue framework supporting a few blood vessels and capillaries. Sparsely scattered throughout were occasional immature cells, either singly or in clusters of a few. Only one fairly large island of hemopoiesis was found in a section of one of the vertebrae, 3.5 by 2 cm. in size (fig. 5). Detailed study of the cells showed them to consist chiefly of erythroblasts, with only a few young myeloid cells. Only rarely was a small megakaryocyte encountered. The capillaries were prominent and distended with erythrocytes. No areas of fibrous tissue replacement were seen. The marrow retained its structure except that it consisted of a meshlike screen from which all of the blood cells, with the exception of a few, had been removed. In other words, it presented a picture of almost complete aplasia (fig. 6).

COMMENT

Mode of Entry.—The extensive use of benzene in industry centers about certain very important properties of the product; first its solvent action, second its fuel action, and third its use as a starting point in the manufacture of dyes and drugs. Chronic benzene fumes in concentrations too low to produce marked narcotic effects are much more likely to be overlooked than is acute poisoning. Industrial poisoning is practically always produced by the inhalation of benzene fumes. Experimental poisoning has resulted from absorption through the skin and by the ingestion and subcutaneous

injection of liquid benzene,[5] but the action of benzene is the same regardless of the mode of entry.

Blood Studies.—After his clinical observations, Selling[3] injected into rabbits suitable doses of benzene in olive oil. Several days after the injections were given the white blood cells began to diminish in number, and in one animal a count of 20 cells per cubic millimeter was obtained. In the early stages of intoxication, large numbers of abnormal cells were seen on smear. Myelocytes were found in the blood of one rabbit. When the leukopenia reached the low grade just mentioned, death occurred in spite of the fact that the injections were stopped.

In later experiments on rabbits, Selling[6] demonstrated a direct destruction of the leukocytes with reduced formation of new elements, destruction of the red blood cells and the prevention of the formation of new ones. Alice Hamilton[7] noted that Selling's valuable contributions have been checked and confirmed many times by research workers as a preliminary to problems which required further study. Greenburg[8] emphasized the fact that the change in the white blood count was by far the most important early sign of benzene poisoning. A destructive action on the blood platelets and on the megakaryocytes of the bone marrow was noted by Duke.[9] The adult forms of the polymorphonuclear leukocytes disappear and, since young forms are not produced, their numbers diminish greatly.

The significant features of the blood in our case were the following: The white blood cell count was 2,800 on admission. A smear of the peripheral blood taken at the same time showed 14 per cent polymorphonuclear leukocytes and 78 per cent lymphocytes. In spite of the fact that a direct transfusion of 300 cc. of whole blood was given within a few hours after hospital admission, the total white cell count dropped to 1,600 within twenty-four hours and to 500 within forty-eight hours. The white cell count never rose above 900 during the remaining twelve days of the patient's life. Frequent studies of stained smears of the peripheral blood revealed a diminution of the granular types of the white blood cells with a marked increase in the lymphocytes.

Held and Lieberson[10] have stressed the fact that benzene poisoning must be considered in the differential diagnosis of any case presenting an obscure anemia. They noted that the degree of the anemia may vary with the individual susceptibility and dosage. A study of figure 1 shows that the hemoglobin content on admission was 38 per cent (Sahli) and the red cell count taken at the same time was 1,740,000. After the first blood transfusion there was an insignificant elevation of both the hemoglobin and the red cell count. The hemoglobin reached 45 per cent on the sixth hospital day after the third transfusion had been given. Thereafter it dropped steadily in spite of transfusions. The red cell count was never elevated above 2,450,000.

In reviewing the literature, one notes that the red cell count in experimental animals with benzene poisoning does not parallel the red cell count in human beings with benzene poisoning. In the former, red cell counts were often normal, whereas in the latter varying degrees of anemia were the rule. Selling and Osgood[11] stressed the element of time in offering an explanation for this paradoxical observation. They noted that the experiment in animals lasted about two weeks and then the animals died or were killed. Within this short time the benzene had not affected the total red blood cell count. In human beings, however, the period of exposure varied from several weeks to years, depending on the individual susceptibility and the concentration of the benzene.

Urinary Sulfate Studies.—Urinary sulfate studies were made on two occasions. The first was done on a specimen of urine obtained the second day after the patient's admission to the hospital, or four days after his occupational exposure ceased. This study indicated that 95 per cent of the total sulfates were excreted as inorganic sulfates. A second study was done five days later. The result indicated that 97 per cent of the total sulfates excreted were in the form of the inorganic sulfate.

In their experiments on dogs, Yant and his co-workers[12] showed that the absorption of small amounts of benzene caused an increased proportion of the total sulfates of the urine to appear as organic salts. These workers felt that the absorbed benzene was oxidized in the body to phenol products. The phenol products were in turn conjugated with the sulfates by the liver and eliminated through the kidneys as conjugated sulfates. In order to determine the rate of excretion of inorganic sulfates in normal unexposed adults, Kammer and his co-workers[13] studied the urinary sulfate excretion of 106 normal (nonexposed) males. They demonstrated that over 80 per cent of the total sulfate was excreted as inorganic sulfate in 90 per cent of this group. From their studies these workers concluded that when the inorganic fraction of the total urinary sulfates of persons exposed to benzene fumes dropped below the experimentally established normal of 80 per cent there could be no doubt that benzene was being absorbed and excreted.

Our studies indicate that the toxic agent (benzene) was no longer present in an active state when the urinary sulfate studies were done. Examination of the blood chart (fig. 1), however, reveals that the rise in the urinary inorganic sulfate excretion occurred at a time when the hemoglobin and red blood cell count continued to fall in spite of repeated transfusions. The white blood cell count at that same time was 900. From a prognostic point of view, in our case, repeated blood studies were of greater value than repeated urinary sulfate determinations. Harrington[14] and Hunter and Hanflig,[15] after a careful review of the cases reported, stated that when the white blood cell count fell below 1,000 the prognosis was very grave. Those patients who died with a white blood cell count of over 1,000 showed evidence of some complication at postmortem examination.

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13. Kammer, A. G.; Isenberg, Nathan, and Berg, M. E.: Medical Supervision of Benzene Plant Workers, J. A. M. A. **111:** 1452 (Oct. 15) 1938.
14. Harrington, T. F.: Industrial Benzol Poisoning in Massachusetts, Boston M. & S. J. **177:** 203 (Aug. 16) 1917.
15. Hunter, F. T., and Hanflig, S. S.: Chronic Benzol Poisoning, Boston M. & S. J. **197:** 292 (Aug. 25) 1927.

Gall [16] performed a sternal biopsy on a 45 year old man whose occupation required his exposure to benzene, ethyl acetate and butanol for about four years. Fixed sections showed replacement of the marrow by loose fibrillar tissue. Markedly diminished numbers of blood elements were noted in the stroma. Immature forms of granulocytes arranged in sparsely cellular groups were seen. Of the mature leukocytes, eosinophils predominated. Normoblasts, erythroblasts and megaloblasts were present in moderate numbers. Megakaryocytes were absent.

Autohemagglutination.—In performing the grouping and cross matching preliminary to the fourth transfusion, a difficulty was encountered. The patient's cells were agglutinated by both testing serums, although on three previous occasions the patient had been found to belong to group O. Moreover, the patient's serum agglutinated the cells of a potential donor of group O. On further study the difficulty was found to be due to an auto-agglutinin. The patient's serum also agglutinated his own cells. The effect of this auto-agglutinin was eliminated by heating the serum and cells to body temperature, and the patient's blood group was confirmed to be group O. Accordingly, 500 cc. of blood was given by the direct Pennel method with no immediate or delayed reaction.

Autohemagglutination is a clumping of erythrocytes into irregular masses, visible to the naked eye, occurring in the presence of the individual's own serum, without bacterial action, at room temperature and reversible at body temperature. After carefully reviewing the literature, Boxwell and Bigger [17] were able to find about twenty-two cases which they believed with certainty were true cases of autohemagglutination. Greenwald [18] added his case of acute hemolytic anemia to this group of cases and noted that this phenomenon may occur in pernicious anemia, acholuric jaundice, multiple myelomas with hyperproteinemia, paroxysmal hemoglobinuria, severe pneumonias and staphylococcic septicemia. As far as we know, autohemagglutination has never been reported in a case of benzene poisoning. In autohemagglutination there is a definite interaction of the agglutinin of serum with the agglutinogen of the red blood cell. This union can occur only at a temperature below that of the body. The effect of the auto-agglutinin in our case was eliminated by heating the patient's serum and cells to body temperature.

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16. Gall, E. A.: Benzene Poisoning with Bizarre Extramedullary Hematopoiesis, Arch. Path. **25**: 315 (March) 1938.
17. Boxwell, W., and Bigger, J. W.: Autohaemagglutination, J. Path. & Bact. **34**: 407 (July) 1931.
18. Greenwald, H. M.: Acute Hemolytic Anemia, Am. J. M. Sc. **196**: 2 (Aug.) 1938.

Care of Feet During Pregnancy.—Normal pregnancy predisposes to disorders of the foot, first, because there is an increase in the weight load on them, and second, because there is frequently weakness of the structures. The enlarged abdomen forces the pregnant woman to walk with her feet everted, and the external rotation is conducive to foot strain and pes valgoplanus. During pregnancy a normal increase in weight is of course expected. This means that greater demands are made on the working ability of the foot. Furthermore, the functional capacity of the foot is decreased to some extent because of limitation of normal activity. For these reasons the orthopedist is in complete agreement with the obstetrician who guards his patients against abnormal increases in weight during pregnancy and recommends that the pregnant woman carry out normal activity as long as possible.—Hauser, Emil D. W.: Diseases of the Foot, Philadelphia, W. B. Saunders Company, 1939.

THE USE OF PROCAINE HYDROCHLORIDE AS A THERAPEUTIC AGENT

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Procaine hydrochloride (introduced as novocain), the successor to cocaine, has long enjoyed a vogue as a local anesthetic, and its value is well recognized. Recently its therapeutic value has been realized and many articles have appeared, especially in the foreign literature, attesting its efficiency and emphasizing its clinical potentialities. Our principal interest is in its therapeutic application, especially with regard to traumatic and orthopedic conditions, but after somewhat sketchily reviewing the literature we feel that it might be worth while to call attention to its application in other branches of medicine and surgery.

Procaine hydrochloride is the hydrochloride of para-aminobenzoyl-diethylaminoethanol. The dosage is from one to three times that of cocaine, and its anesthetic and irritant actions are perhaps slightly less. The drug on direct application acts by paralyzing the sensory nerve fibrils without preceding stimulation, but in higher concentrations it will paralyze all other nerve fibers and indeed all protoplasm. It also causes local vasoconstriction.

The number of different conditions in which it is employed is great. Its therapeutic use is advocated in various syndromes in internal medicine, in urology, in eye, ear, nose and throat work, in dental surgery, in general surgery, in obstetrics and even in psychiatry.

Turning to internal medicine, one finds articles advocating procaine hydrochloride in angina pectoris, bronchial asthma, apoplectic shock, intermittent claudication, arteriosclerosis, herpes zoster and other conditions, while in general surgery it has been reported of value in ileus, fantom limb pain,[1] cutaneous cicatrices [2] and certain infectious and inflammatory processes. In urology it has been recommended in acute epididymitis and in many of the complications of gonorrhea. One article advocated its use in puerperal phlebitis. However, it is its use in traumatic and orthopedic conditions in which we are chiefly interested, and it is in this field that we have quite extensively employed procaine hydrochloride therapeutically in this clinic during the past year.

MECHANISM

Procaine hydrochloride is of value in these conditions, according to Leriche, because it suppresses by means of its local anesthetic action the nerve irritation inaugurated by trauma. There exists a rich nerve supply in the supportive tissues of the human skeleton, especially in the ligaments in the region of an articulation. Following trauma, a violent excitation of this supply occurs with a disturbed vasomotor functional state characterized clinically by muscle spasm, loss of motion, pain and tenderness. By eliminating the pain impulses that emanate in automatic waves from the

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1. Livingston, W. K.: Fantom Limb Pain: A Report of Ten Cases in Which It Was Treated by Injections of Procaine Hydrochloride Near the Thoracic Sympathetic Ganglions, Arch. Surg. **37**: 353-370 (Sept.) 1938.
2. Leriche, René: Treatment of Pains Due to Cutaneous Cicatrices, Progrès méd., Jan. 9, 1937, p. 49.

traumatized area it causes a return of the normal vasomotor tone and for the time being and often permanently normal regulatory impulses are set up.

In brief, following trauma there is a change in the normal vasomotor equilibrium with the development of hyperemia due to vasodilatation. Procaine therapy, by eliminating pain impulses and by virtue of the fact that it is a vasoconstrictor, causes a return to a normal vasomotor equilibrium.

FRACTURES

Procaine hydrochloride has been used in fracture work as an anesthetic agent for many years, but recently its therapeutic use has been advocated in specific types of fractures—mainly those in which severe ligamentous injury was primary and the fracture itself of secondary importance. Such injuries include fractures of the transverse processes, chip fractures of the humeral epicondyles, undisplaced fractures of the head of the radius and fractures of the spinous processes of the vertebrae. We have employed procaine hydrochloride in all these conditions with gratifying results, both functionally and economically.

We have observed in our extensive use of local anesthesia in the treatment of fractures in general, and especially Colles fractures, that the patient's postreduction course was much more pain free and was accompanied by an earlier restoration of function as compared to the use of general anesthesia. We had been at a loss to account for this, as the anesthetic effect in itself wears off in a few hours, until we studied Leriche's articles in which he points out that anesthesia with procaine hydrochloride reestablishes the disturbed vasomotor equilibrium by removing pain impulses.

Briefly, a few instances will be cited in which procaine hydrochloride was used therapeutically in the treatment of fractures, sometimes accompanied by physical therapy.

CASE 1.—A man aged 68 who was in an automobile accident twenty-four hours previous to examination complained of a painful, stiff neck. Examination revealed generalized tenderness from the third to the sixth cervical vertebra with widespread cervical muscle spasm. The head was tilted to the right. X-ray examination revealed fractures of the third, fourth and fifth cervical spinous processes. He received an injection of 2 per cent procaine hydrochloride with immediate relief of pain and prompt disappearance of spasm and tenderness. The tenderness and pain later recurred to a mild extent but finally disappeared almost completely after a second injection three weeks from the date of the injury.

We were interested after treating this patient to read an article by Fritz Schnek [3] in which he recommended treating avulsion fractures of the spinous processes with procaine hydrochloride. Fractures of the spinous processes are difficult, almost impossible, to reduce, let alone to retain in the reduced position until bony union is complete. Experience shows that bony union seldom occurs, the majority healing with pseudarthrosis. The latter causes no trouble worth mentioning. Hence, when procaine therapy is used pain is allayed and the patient is convinced of the harmlessness of his injury, since all movements are possible as soon as the anesthetic takes effect.

CASE 2.—A man aged 27 sustained direct injury to the left elbow twenty-four hours before examination. Clinical and x-ray examinations revealed a small fracture of the head of the radius with no displacement of the fragments. The patient received one injection of procaine hydrochloride with almost complete relief of pain and with a good return to rotation of the forearm, although following injection there was some limitation of complete extension. He was followed closely and fourteen days after his injury had no soreness about the elbow, normal rotation and about 5 degrees of flexion deformity. He was given physical therapy from the outset and kept at his work, which consisted of moderately heavy manual labor.

Several fractures of the transverse processes of the lumbar spine have been treated by this method.

CASE 3.—A high school football player with fractures of the second and third right lumbar transverse processes received one injection with complete relief of pain and spasm and return of full motion. This patient several days later participated for several minutes in a football game, against our advice, in order to earn his letter.

It is with fractures of the transverse processes that we feel that procaine therapy is especially valuable, for any other treatment such as braces, corsets, plaster of paris casts or open operation may unwillingly foster neurotic fixations and lead to prolonged disability.

We realize that the recommendation of procainization and activation in fractures of the lumbar transverse processes is at variance with the accepted methods now generally employed. However, in such injuries the essential pathologic process is the associated ligamentous tear, the fracture itself being of secondary importance. Since the ligamentous origin of the psoas major, the quadratus lumborum and the sacrospinalis muscles is extensive, there is little likelihood of further trauma being inflicted by active use of the muscle group after procaine hydrochloride has been used to abolish the pain impulses.

Reduction of these fractures of the transverse processes is difficult to achieve, and the aim of the accepted treatment by casts, braces or bed rest is essentially for the relief of pain. Procaine hydrochloride, in eliminating the pain impulses, permits active mobilization and does away with the undesirable sequels seen with immobilization such as atrophy, stiffness and the neurotic fixations that are especially common in fractures of the transverse processes.

A fracture of the lateral epicondyle of the humerus was treated by injection of procaine hydrochloride several months ago in a patient admitted with multiple fractures of the lower extremities. One injection was all that was required to permit complete return of function to the affected elbow, with permanent subsidence of pain and muscle spasm and with full immediate return of motion.

Leriche and Froehlich [4] in 1936 published an account of their results of treating certain articular fractures with procaine hydrochloride infiltration and immediate active mobilization. In articular fractures without displacement, or with a displacement not requiring an exact reduction, these authors infiltrated the surrounding ligaments as though there was a sprain as well as the focus of the fracture itself in such a fashion as to block the vasomotor phenomena which create secondary arthritis, thus permitting by suppression of the pain an immediate active mobilization.

Leriche presented three cases in detail in which he had employed procaine therapy and concluded that the

3. Schnek, Fritz G.: Treatment of Avulsion Fractures of Spinous Processes, Wien. klin. Wchnschr. **50**: 191-193 (Feb. 12) 1937.

4. Leriche, René, and Froehlich, F.: Treatment of Certain Articular Fractures by Procaine Hydrochloride Infiltration and Immediate Active Motion, Presse méd. **44**: 1665-1666 (Oct. 24) 1936.

method has a wide margin of application in all cases in which there is no absolute necessity for reduction and maintenance of the reduction by apparatus. He writes that it is astounding to see how the immediate restoration of function and the suppression of pain, signs of a post-traumatic vasomotor imbalance, improve the quality of the result and notes that simple surgical good sense is sufficient to indicate the limits of this new manner of obtaining immediate mobilization in fractures. Our observations coincide with his and we have been equally impressed by the results of treatment.

SPRAINS

Procaine hydrochloride also has a wide use in the treatment of sprains. The mechanism again is similar to that mentioned earlier and consists of suppressing the nerve irritation by means of local anesthesia of the ligament.

There are three groups of sprains in which this drug may prove of great value: The first group includes sprains unaccompanied by fractures or ligamentous tears. The former are ruled out by x-ray examination and the latter by absence of abnormal articular laxity. In this group one or two injections may be sufficient to permit normal, painless function of the joint. In the second group, those characterized by pain and muscle atrophy—the after-effects of sprains—procaine hydrochloride is often of great benefit. The third group consists of "operation sprains"—those characterized by pain, tenderness and some interference with function following operations on joints.

In those instances in which a tear of a ligament is present, the injection of procaine hydrochloride into the ligament proves itself a diagnostic aid and indicates the need of immobilization as the treatment of choice.

Although sprains may be treated at all stages by injections of procaine hydrochloride, the most prompt and constant results are obtained in those cases in which the injections are performed in the first twenty-four hours.

CASE 4.—A truck driver aged 25 was in an automobile accident the day before he was examined, having been pinned beneath a truck. Weakness in the right upper extremity developed, with much pain in the right shoulder. Examination revealed a very tender area over the acromioclavicular joint with severe pain localized at this joint on motion of the shoulder joint. The x-ray examinations gave negative results. A diagnosis of acromioclavicular ligamentous sprain was made and 2 per cent procaine hydrochloride was injected with considerable immediate relief. When he was seen forty-eight hours later there was excellent motion and no pain on motion. He was advised to return to work.

CASE 5.—A man aged 30, a laborer, was placing a piston in an engine by pushing with his feet and bracing with his back. Suddenly he felt his back "give way" and experienced severe pain in the small of the back. He was examined twenty-four hours after the accident and typical signs of sacro-iliac sprain were found on the right side. It was decided to treat this patient conservatively, and accordingly he was placed in traction. For three weeks there was very little change in the physical appearance; the tenderness, limitation of motion and muscle spasm were almost as marked as on admission. At the end of the third week procainization was inaugurated, two injections being employed at intervals of four days. The results were most striking, especially when compared to the slow progress made under the accepted conservative method of treatment. The patient, after the first injection, became ambulatory and received a second injection only because of a moderate recurrence of symptoms. He has since had no pain.

MUSCLE CONTUSIONS

In addition to fractures and sprains, a third traumatic entity in which excellent results have been obtained is that group labeled muscle contusions or muscle sprains. The mechanism once again consists in restoring a normal vasomotor equilibrium. We have treated among others contusions of the trapezius, deltoid and rhomboid muscles and contusions of the common extensor group of the forearm. One or two examples may suffice:

CASE 6.—A high school basketball player was kicked on the right side of the neck with resulting swelling, tenseness and tenderness of the belly of the right trapezius muscle. The injury was a particularly disabling one requiring admission to the hospital. After three injections of procaine hydrochloride there was no longer any tenderness or spasm and very little limitation of motion. When seen several weeks after his discharge from the hospital, he had no symptoms or signs pertaining to the trauma.

CASE 7.—A young man was struck across the extensor surface of the right forearm just below the elbow by a falling log. He had immediate complete disability, with exquisite pain, tenderness, loss of function and marked spasm. Although a fracture was suspected, the x-ray films were negative and following one injection of 2 per cent procaine hydrochloride into the proximal dorsal surface of the forearm there was complete subsidence of the signs present before injection. When seen one week later there were no residua of the trauma.

TRAUMATIC SYNOVITIS

The treatment of acute traumatic synovitis by procaine hydrochloride has been followed with striking improvement in those instances in which it has been employed. We call to mind in particular two cases of acute traumatic synovitis in which injection of the drug into the joint along with aspiration of the syrupy, bloody fluid was accompanied with complete relief of pain, permanent in these two cases, and with a rapid, early restoration of complete articular function.

BURSAE

In the various inflammations of bursae, often associated with calcification of the bursa or an adjoining tendon, procaine therapy has in our series of cases proved an excellent method of obtaining an early, often permanent, cure. Cases of acute subdeltoid bursitis and subacute subdeltoid bursitis associated with calcification have all been treated by this method.

CASE 8.—A woman aged 66 seen in the clinic complained of severe pain in the right shoulder of three days' duration. Previous to the onset of the acute pain she had had dull pain for weeks, being unable to use the shoulder. She was unable to sleep at night because of the intensity of the pain. Examination revealed a point of exquisite tenderness over the greater tuberosity with external rotation and abduction limited and painful. X-ray examinations were negative. The impression was that it was acute subacromial bursitis and the treatment consisted of one injection of 2 per cent procaine hydrochloride at the site of maximum tenderness. The patient obtained almost complete relief. When seen one week later, she stated that she was having only slight occasional pain and was sleeping well. There was no tenderness, and motion was of full range. Her symptoms have not recurred.

Injection of procaine hydrochloride has been carried out in seven cases of calcification of the supraspinatus tendon with marked prompt relief in the majority of cases, although it must be pointed out that needling the calcium deposits, thus relieving the tension, may in itself be sufficient to ease the pain. Two patients with

peritrochanteric bursitis with calcification have also been treated in this manner with a prompt disappearance of symptoms.

It has already been stated that in traumatic syndromes procaine hydrochloride, by abolishing the hyperemia due to vasodilatation, causes vasoconstriction and thus, in temporarily abolishing the pain impulses from a part, permits the restoration of a normal vasomotor tone. However, there are some conditions, the arthritides and the neuralgias among others, in which the pain is due to hypoxemia induced by spasm of the vasa vasorum and the vasa nervorum. In these instances the result of procainization is a matter of vascular dilatation and lasting hyperemia, but here, as in traumatic conditions, the underlying physiologic process is a restoration of the vasomotor tone to its normal state.

ARTHRITIS

In the field of arthritis, procaine therapy has been employed by many men.[5] Fenz and Falta[6] have in osteo-arthritis infiltrated the musculature and ligaments about affected joints with encouraging results. In hip disease the region of the adductors or of the gluteal musculature is injected. In traumatic arthritis the drug may be of value prophylactically and actively. If, as Leriche[7] indicates, the post-traumatic arthritides follow minor articular trauma, the use of procaine hydrochloride in these conditions, namely sprains and contusions, must surely serve as a preventive for the later development of traumatic arthritis. If osteo-arthritis already exists, especially if aggravated by trauma, procaine therapy often proves of definite value, although in this category the responses are not so dramatic as in the acute traumatic conditions.

CASE 9.—A man aged 51, recently seen in the clinic, complained of severe pain in the right shoulder and limitation of motion of the right shoulder joint. He had had direct injury to the shoulder several days before admission, and examination revealed exquisite tenderness over the acromioclavicular joint with severe pain on motion of the upper extremity. X-ray examination revealed osteo-arthritic changes of the acromioclavicular joint and no evidence of fracture. He received several injections of procaine hydrochloride. Following each injection there was almost complete relief of pain and marked return of function, but after several days the pain and loss of motion would return. However, after several injections the severe pain gradually subsided and the range of motion increased much more rapidly, we feel, than it ordinarily does in similar cases in which physical therapy, rest or splinting is instituted.

SCIATICA

Many authors recommend procainization in sciatica.[8] Various technics of injection have been outlined, some of which consist of injecting the fluid directly into the nerve trunk while others are concerned with epidural deposits. Fenz[9] proved beyond doubt that the effect, which was instant and sometimes lasting, was due to the procaine hydrochloride and not to the large amount of fluid deposited by showing that the same amount of physiologic solution of sodium chloride, without procaine hydrochloride, had no effect whatever.

While the underlying etiologic factors that give rise to the sciatic syndrome are increasing in number each year—the most recent important contribution being concerned with the role of the ruptured nuclear disk—there is still a sufficient number of patients with idiopathic sciatica to warrant the use of procaine therapy in such cases for the relief of symptoms.

Among the other conditions in which procaine therapy seems to have been of value may be mentioned tennis elbow and painful xiphoid processes. In the latter, a series of injections may be required before lasting relief is obtained.

TECHNIC

The technic of procaine injection is comparatively simple: 1. From 10 to 30 cc. of 1 or 2 per cent solution of procaine hydrochloride is injected at the site of maximum tenderness. Needless to state, absolutely sterile precautions must be observed. The needles and syringe are those used ordinarily for local anesthesia.

2. Before injection it is best to give the patient orally sodium amytal, usually from 1½ to 3 grains (0.1 to 0.2 Gm.). This is done to prevent procaine reactions, which are frequently observed but are usually of a harmless nature.

3. After the injection the patient is encouraged to employ immediate active motion. He is generally astonished to find painless motion possible.

4. Repeated infiltrations, at daily intervals if necessary, are carried out if a recurrence of symptoms develops.

5. The patient should be told two things: (*a*) He should be urged to employ immediate active motion; (*b*) he should be warned to expect increased pain several hours after injection. This is caused by an increase in the blood supply to the tissues infiltrated with procaine hydrochloride but usually disappears in a short time.

This therapeutic agent which we propose for use in a number of minor traumatic and orthopedic conditions has proved exceptionally efficacious in our hands.

SUMMARY

1. Procaine hydrochloride as a therapeutic agent is valuable in certain acute traumatic syndromes and has widespread use in many of the specialties.

2. The action of the drug is in restoring a normal vasomotor tone by eliminating the pain impulses. In acute traumatic conditions procaine hydrochloride overcomes the hyperemia due to vasodilatation, while in the arthritides and neuralgias the spasm of the vasa vasorum and the vasa nervorum, with a resulting hypoxemia, is abolished. In both instances procaine hydrochloride, by eliminating pain impulses, permits a restoration of a normal vasomotor equilibrium.

3. Procaine therapy is of definite value in fractures not requiring accurate reduction and immobilization. Such fractures include fracture of the lumbar transverse processes, fractures of the vertebral spines, fractures of the head of the radius and fractures of the epicondyle, among others.

4. Ligamentous sprains, muscle contusions or sprains, acute traumatic synovitis and acute bursal episodes are other conditions in which the drug has been used with striking results.

5. Procaine hydrochloride has given encouraging results in certain cases of arthritis and sciatica.

5. Tarsy, J. M., and Steinbrocker, Otto: Supraclavicular Brachial Plexus Block: An Accessory Therapeutic Measure in Arthritis of the Shoulder Joint and Allied Conditions, New York State J. Med. **37**: 1275-1278 (July 15) 1937.

6. Falta, W., and Fenz, E.. The Therapeutic Value of Novocain Infiltration in Internal Medicine, Wien. klin. Wchnschr. **51**: 578 (May 27) 1938.

7. Leriche, René: The Problem of Osteo-Articular Diseases of Vasomotor Origin, J. Bone & Joint Surg. **10**: 492-500 (July) 1928.

8. Corneliu Sarbatorescu, of Jassy, Rumania, cited in Treatment of Sciatica with Local Anesthesia, Bucharest letter, J. A. M. A. **107**: 144 (July 11) 1936.

9. Fenz, W.: Presacral Procaine Hydrochloride Injections in Sciatica, Vienna letter, J. A. M. A. **108**: 15: 1275 (April 10) 1937.

COMPARATIVE EFFECTS OF PHENOBARBITAL AND DILANTIN SODIUM

IN THE TREATMENT OF EPILEPSY

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This paper embodies observations on the comparative effects of phenobarbital and dilantin sodium in the treatment of epilepsy.

Material for this study comprised a group of 100 patients at the Monson State Hospital, who were selected on the basis of frequency and regularity of convulsive attacks regardless of diagnosis, age, sex, age of onset, duration of attacks, mental status, physical condition or previous medication. The vast majority of the patients had been having ten or more seizures per month regularly. Medication previous to this study had consisted of phenobarbital in doses of 3 grains (0.2 Gm.) or less daily.

The effect of treatment by phenobarbital or dilantin sodium was evaluated on the basis of effect on seizures, salutary effects, effects on the general condition of the patient, and untoward effects. The therapeutic response was graded as follows:

Group 1. Complete control of, or marked reduction in the number of seizures, with absence of untoward effects or only slight and easily managed untoward effects.

Group 2. Moderate reduction in the number of seizures with salutary effects or easily controlled untoward effects.

Group 3. No appreciable reduction in the number of seizures or increased number of seizures, with or without untoward effects; or marked untoward effects which could be managed only by terminating treatment and which overshadowed any anticonvulsant and/or salutary effects.

Group 4. Indeterminate, no definite favorable or unfavorable effects being noted during the period of observation.

Our study divided itself into the following three phases: (1) treatment with phenobarbital alone, (2) treatment with dilantin sodium alone and (3) treatment with a combination of phenobarbital and dilantin sodium.

PHENOBARBITAL IN EPILEPSY

The 100 patients, representing the total number of cases included in our complete study, were given phenobarbital in gradually increasing doses either until the optimal anticonvulsant effect was obtained or until untoward effects contraindicated further increases or demanded reduction in dosage. Thirty-seven of the 100 patients derived marked benefit from the larger doses of phenobarbital alone and are classed as P 1 (P refers to phenobarbital and the numeral 1 to group 1 in the classification previously indicated). During the period of increased phenobarbital dosage, the maximal and optimal doses of phenobarbital ranged from 3¼ to 11¼ grains (0.2 to 0.7 Gm.) a day. Twenty-eight patients are taking 6 grains (0.4 Gm.) or more of phenobarbital a day and twelve are receiving 9 grains (0.6 Gm.) or more of phenobarbital a day. Twenty-seven of the thirty-seven patients have been on the larger doses of phenobarbital for from eleven to fifteen months and ten for from three to ten months. Only a few patients experienced untoward effects, which have been slight, transient and easily managed. Salutary effects have been common, consisting of increased activity, alertness, desire and willingness to work, and greater interest in surroundings.

DILANTIN SODIUM IN EPILEPSY

Fifty-six patients who were not greatly benefited by large doses of phenobarbital were given dilantin sodium in gradually increasing doses, ranging from 3 to 13½ grains (0.2 to 0.9 Gm., or two to nine capsules). The criteria used for changing medication from phenobarbital to dilantin sodium were (1) complete failure of large doses of phenobarbital to lessen frequency of seizures, (2) only slight to moderate reduction in the number of seizures and (3) untoward effects associated with large doses of phenobarbital, which either prevented raising phenobarbital to the anticonvulsant level or which overshadowed any favorable anticonvulsant effects.

Forty-five of the fifty-six patients have been followed for from two to eight and one-half months while taking dilantin sodium and eleven for from three weeks to two months. The length of time these patients had been receiving the larger doses of phenobarbital varied from three weeks to six and one-half months.

Evaluation of the results obtained with this group of patients is summarized as follows:

Twelve, or 21.4 per cent, obtained excellent improvement on dilantin sodium with regard to both anticonvulsant and salutary effects (group 1). Of these twelve patients only two did equally well on phenobarbital.

Seventeen patients, or 30.3 per cent, showed moderate improvement on dilantin sodium (group 2). Of these seventeen patients, eleven did equally well on phenobarbital and six were definitely worse on phenobarbital.

Totaling the number of patients in groups 1 and 2, we find that twenty-nine, or 51.7 per cent, were much improved on dilantin sodium. This includes thirteen patients who did as well on phenobarbital.

Twenty-seven patients, or 48.2 per cent, did poorly on dilantin sodium (group 3). Of these twenty-seven patients, four did moderately well on phenobarbital, and twenty-three did as poorly on phenobarbital.

Whatever results have been obtained with dilantin sodium have been obtained in a group of patients all but two of whom were selected on the basis of failure to respond satisfactorily to large doses of phenobarbital. The results with dilantin sodium impress us as especially significant because we are inclined to believe that any anticonvulsant drug is unlikely to show up to its best advantage in many institutional patients of this type.

There was no correlation between results with dilantin sodium and dosage, for some patients taking

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While observations on the effects of larger doses of phenobarbital were being made, we learned of the use of dilantin sodium by Merritt and Putnam through personal communication and published data (Merritt, H. H., and Putnam, T. J.: Sodium Diphenyl Hydantoinate in the Treatment of Convulsive Disorders, J. A. M. A. **111**: 1068-1073 [Sept. 17] 1938). Part of the dilantin sodium in our study was furnished us through Dr. J. D. Ralston, of Parke, Davis & Co.

as little as 4½ grains (0.3 Gm., or three capsules) of dilantin sodium did very well, while others receiving as much as 13½ grains (nine capsules) did not do well. The optimal dose varied from 3 to 10½ grains (0.2 to 0.7 Gm., or two to seven capsules). Likewise there was no correlation between the size of the dose of phenobarbital and the results obtained. The optimal dose of phenobarbital varied between 3 and 11 grains.

While, to be sure, most patients in this series experienced toxic effects from the larger doses of phenobarbital or from dilantin sodium at some time, it should be kept in mind that, in the very nature of this investigation, unless an appreciable anticonvulsant effect was produced by a nontoxic dose, it was necessary to increase medication steadily to the point of toxicity.

Lethargy, ataxia, anorexia, nystagmus and tremor were toxic effects common to phenobarbital and dilantin sodium; whereas epigastric distress, ocular pain, diplopia and hyperplasia of the gums were related solely to dilantin sodium. Benzedrine sulfate was found effective in controlling apathy and lethargy, and sodium bicarbonate in controlling nausea and vomiting. The other untoward effects were controlled by decreasing the dose of the drug. A distinct advantage of dilantin sodium is the lack of sedative effects except in toxic doses, which is in marked contrast to the effects of phenobarbital in the larger, therapeutic doses. None of our patients had dermatitis while on dilantin sodium, and no serious untoward effects were associated with dilantin sodium therapy.

From experience gained during the course of this study, we believe that untoward effects could often have been considerably lessened had we increased the doses of phenobarbital and dilantin sodium more slowly than was done and temporarily reduced the doses more often during periods of inactivity. During the first part of the period in which we used dilantin sodium we gave some patients as much as nine capsules a day (13½ grains), since we did not know what the limit of dosage should be. Untoward effects were common and almost invariable when more than six capsules (9 grains) a day were given. Now we have established six capsules as the maximum limit of dosage; and we hesitate in giving more than four capsules (6 grains) a day.

COMBINED PHENOBARBITAL AND DILANTIN SODIUM IN EPILEPSY

During the course of the second part of the study, designed to evaluate the comparative effects of phenobarbital and dilantin sodium, it was found that several patients received no appreciable beneficial anticonvulsant effects from either of these drugs. In some cases the patients were intolerant to relatively small doses of either drug, while in other cases large doses, although well tolerated, had little or no anticonvulsant effect. This situation prompted us to try a combination of well tolerated smaller doses of phenobarbital and dilantin sodium. Such medication was in some instances rewarded by remarkably gratifying results: Seizures were greatly reduced in number, untoward effects did not appear, and salutary effects sometimes accompanied the reduction or cessation of seizures.

Twenty patients are now on medication consisting of a combination of phenobarbital and dilantin sodium in small to moderate size doses. Six of the twenty patients have been on combined therapy for from four to six months, thirteen patients for from two to three months and one patient for one month. Combined therapy for these twenty patients has in most instances been more beneficial than any previously used medication; and with eight patients the favorable response to combined therapy has been impressive.

COMMENT

With regard to the type of patients selected in this study, it should be kept in mind that all were institutional patients, all were selected on the basis of frequent seizures, many were of low grade type and deteriorated, and most of them had had seizures for many years. Thus, a certain number of our patients were perhaps of a type less likely to benefit by any therapeutic approach. As a rule, the patients who obtained greatest benefit, whether receiving the larger doses of phenobarbital alone, dilantin sodium alone or combined phenobarbital and dilantin sodium medication, were the younger and better preserved. However, exceptions were sufficiently numerous to encourage therapeutic efforts even in seemingly hopeless cases.

When dilantin sodium proved more efficacious than phenobarbital, the results were usually quite striking. Combined medication, resorted to after patients had had a fair trial with phenobarbital and dilantin sodium alone to compare the effects of these drugs separately, was found to be of decided advantage.

(In a group of patients who approach the noninstitutional type, being better preserved and having less frequent seizures—not included in the present report—we are finding that both dilantin sodium and combined medication are giving definitely better results on the whole.)

We believe that dilantin sodium is a most welcome contribution on three grounds: first, it is superior to phenobarbital in some cases in which phenobarbital can control seizures only to a limited extent or not at all; second, it is often a most effective adjunct used in combination with phenobarbital; and third, it has no sedative effect in therapeutic doses.

In closing this paper we would emphasize what is perhaps too often taken for granted, but sometimes neglected; namely, individualization of treatment. By this we mean periodic reevaluation and readjustment of medication in epilepsy, rather than application of a more or less rigid standard dose of one drug prescribed without variation. This thought, conceived before the present study began, was substantiated by experience with many cases in which the usual doses of phenobarbital were given with disappointing results and in which larger doses of phenobarbital, dilantin sodium or combined phenobarbital and dilantin sodium produced gratifying benefit.

CONCLUSIONS

1. Phenobarbital in doses up to 11¼ grains a day over a prolonged period of time can be safely administered with marked benefit to many patients with epilepsy.

2. Dilantin sodium is of distinct value in some cases in which large doses of phenobarbital produce little or no beneficial anticonvulsant effects and should be tried when phenobarbital produces uncontrollable apathy. Dilantin sodium produces no sedative effect except in toxic doses.

3. A combination of phenobarbital and dilantin sodium often produces most gratifying results where phenobarbital or dilantin sodium alone gives little benefit or is ineffectual.

CORRECTION OF PROTHROMBIN DEFICIENCIES

BY MEANS OF 2-METHYL-1, 4-NAPHTHOQUINONE INJECTED INTRAMUSCULARLY

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We wish to report our experience with a very simple method of producing prompt restoration of the plasma prothrombin in the absence of liver damage.

The material that we have employed during the past six months is synthetic 2-methyl-1, 4-naphthoquinone, which Ansbacher and Fernholz [1] have shown to possess marked vitamin K activity. This substance is being administered orally in small amounts for prothrombin deficiencies in several clinics without toxic effects, but Koller [2] noted nausea and vomiting when as much as 3 mg. per kilogram of body weight was administered. It appeared to us that if the material could be given intramuscularly its absorption would be assured and its effects might be prolonged. Macfie, Bacharach and Chance [3] have more recently reported beneficial effects from the intramuscular injection of this substance in doses of from 5 to 10 mg. daily.

Types of Cases in Which Therapy Was Employed

Diagnosis	Number of Cases	Response in Percentage of Normal
Obstructive jaundice due to stone	10	10-48
Hemorrhagic disease of newborn (dose of 0.35 to 1 mg.)	6	10-30
Carcinoma of stomach	3	10-20
Carcinoma of head of pancreas	2	40
Cirrhosis of the liver	2	Continued to fall
Thrombasthenia	1	28
Empyema, sepsis	1	35
Catarrhal jaundice	1	6
Nephrosis with septicemia	1	47
Liver abscesses with empyema	1	12

The material is dissolved in corn oil and sealed in 2 cc. ampules, each cubic centimeter of the solution containing 1 mg. of 2-methyl-1, 4-naphthoquinone. The ampules are then sterilized in the autoclave at 20 pounds pressure for one hour and opened as required.

Since earlier studies [4] indicated that doses of from 50 to 100 mg. of the substance were toxic when injected into dogs, we first carried out a series of experiments on rats, injecting 0.5 mg. of naphthoquinone in 0.5 cc. of corn oil intramuscularly and studying the muscles at intervals, but were unable to detect any local or systemic effects of a deleterious nature. We then injected doses of 2 mg. into dogs and found remarkably prompt and prolonged effects on the prothrombin. In a dog with a preinjection plasma prothrombin level of 50 per cent by the test devised by Warner, Brinkhous and Smith,[5] a single injection of 2 mg. of 2-methyl-1, 4-naphthoquinone raised the prothrombin level to 80 per cent, and eighteen days elapsed before it again fell. Tage-Hansen [6] found similarly prolonged effects when from 150,000 to 400,000 units of purified vitamin K was injected intramuscularly. Our experiments on animals indicate that the effects may begin to be evident as early as eight hours after injection.

Since Oct. 1, 1939, we have administered 2-methyl-1, 4-naphthoquinone intramuscularly to twenty-eight patients with initial prothrombin levels of from 5 to 70 per cent of normal. Each adult patient received 2 mg., except three who were given 4 mg. of 2-methyl-1, 4-naphthohydroquinone dipropionate, which is one half as potent, and the infants received from 0.35 to 1 mg. In twenty-six of the twenty-eight cases this was followed by a prompt rise of the plasma prothrombin level. The two individuals in whom it was ineffective had marked liver damage, which has been found to interfere with the production of prothrombin.[7] These patients also failed to respond to double the amount at repeated intervals.

In many instances a single dose was sufficient to restore the prothrombin to a satisfactory level, and in most the higher value was maintained for from several days to a week; but in several instances the injection was repeated at intervals of three days with beneficial effect. The types of cases in which this therapy was employed and the response in percentage of normal level obtained to a single injection of 2-methyl-1, 4-naphthoquinone (or the equivalent 4 mg. of the dipropionate) are listed in the accompanying table.

The routine which we now employ for patients with lowered plasma prothrombin is as follows:

If such patients are bleeding on admission to the hospital, transfusions are given both to restore the blood lost and as a means of administering prothrombin directly.

All patients with plasma prothrombin levels below 70 per cent immediately receive 2 mg. of 2-methyl-1, 4-naphthoquinone intramuscularly and the response after twenty-four and forty-eight hours is noted. If the prothrombin level is still below 70 per cent, the injection is repeated at intervals of three days, until the normal value is restored. In our experience at most two or three injections suffice to produce the desired result unless severe liver damage is present. Since we have been interested particularly in the quantitative response, we have employed small but adequate doses, but we can see no reason for hesitating to use more frequent injections or possibly to double the amount should these be indicated.

CONCLUSIONS

From the experience outlined as well as from our experiments made on animals, the following conclusions are drawn:

1. The intramuscular injection of 2-methyl-1, 4-naphthoquinone dissolved in corn oil is a simple and

This study was carried out under a grant from the John and Mary R. Markle Foundation.

From the Department of Surgery of the New York Hospital and Cornell University Medical College.

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effective means of restoring the plasma prothrombin level in the absence of severe liver damage.

2. Single injections of as little as 2 mg. of this substance restore the level of plasma prothrombin by as much as 48 per cent, and the effect is evident as early as eight hours after injection.

3. The effect of a single injection may be prolonged for as long as a week, unless adverse factors such as operations on the biliary tract or other liver damage supervene.

4. No toxic effects have been noted resulting from doses of as much as 4 mg. in patients or in animals.

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THE USE OF CITRATED PLASMA IN THE TREATMENT OF SECONDARY SHOCK

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This paper is concerned with offering evidence of the effectiveness of human blood plasma in the treatment of secondary shock. This work is part of a general investigation conducted by members of the staff of the Bryn Mawr Hospital for the past several years concerning the rationale of the transfusion of whole blood and of plasma.

While we are not primarily concerned in this paper in the investigation of the mechanism of secondary shock, it is opportune to mention the causative factors underlying its production. The existence of any hypothetic toxic substance responsible for secondary shock, as suggested by Cannon,[1] has not been confirmed by the experimental work of Blalock and his associates[2] and of O'Shaughnessy and Slome.[3] The initiating factors are various and include bleeding at the site of injury (external and/or internal[4]), loss of plasma in the traumatized tissue,[5] loss of plasma followed by hemoconcentration in burns and in trauma to the intestine,[6] cold, fear, pain, asphyxia, infection, dehydration, in brief, all stimuli leading to hyperactivity of the sympathetic nervous system and vasoconstriction with consequent relative asphyxia of the peripheral tissues and increased permeability of the capillaries, with loss of blood plasma resulting in a loss of blood volume.[7] It is generally admitted that this decrease in the volume of circulating blood is the essential lesion in secondary shock. The following working definition may be accepted: "Shock is the clinical condition characterized by progressive loss of circulating blood volume, brought about by the tissue anoxia which results from inadequate circulation."[8]

In view of this premise it appears obvious that the ideal therapeutic agent would be the one enabling the attending physician to increase rapidly and permanently the patient's blood volume. To this purpose transfusion of whole blood has been the best answer. Substitutes to blood transfusion in the treatment of secondary shock have so far generally failed. Thus physiologic solution of sodium chloride and dextrose solution, which are readily available, do not produce a permanent increase in the circulating blood volume, as in the majority of cases they rapidly leave the circulation.[8] The use of acacia solution,[9] although more effective than physiologic solution of sodium chloride in maintaining circulating blood volume,[10] is often followed by severe reactions.[11]

On close analysis, however, whole blood is not the ideal agent. There are two essential drawbacks, which have been emphasized by Mahoney:[12] first, the interval of time necessary to make whole blood available for transfusion and, second, the undesirable addition of red cells to the already concentrated blood. The latter is especially evident in burns.

The employment of citrated blood preserved by refrigeration promised to be for a time a partial solution to the first objection. Recent studies, however, in our own laboratories[13] suggest that the period of useful and safe preservation is no more than five days. Other workers have recently placed the period of useful preservation of citrated blood up to ten days.[14] Even when a blood donor of suitable type is available or refrigerated blood is on hand, at least one hour is required for proper cross matching (collection of specimen from donors and patient, separation of serum, cross matching and the like). The usefulness of citrated preserved blood is further limited by the fact that it cannot be transported, because mechanical agitation greatly hastens the breakdown of erythrocytes. In addition to these drawbacks, one must consider the occurrence of post-transfusion reactions. Generally these occur in from 5 to 10 per cent of cases. In shock, however, owing to the emergency and the temptation to hasten the preliminary steps in the preparation of blood and to increase the speed of administration, reactions are even more common. Severe reactions usually due to hemolysis are relatively rare, and the incidence of death directly attributable to blood transfusion in

From the Laboratory of Clinical Pathology of the Bryn Mawr Hospital.

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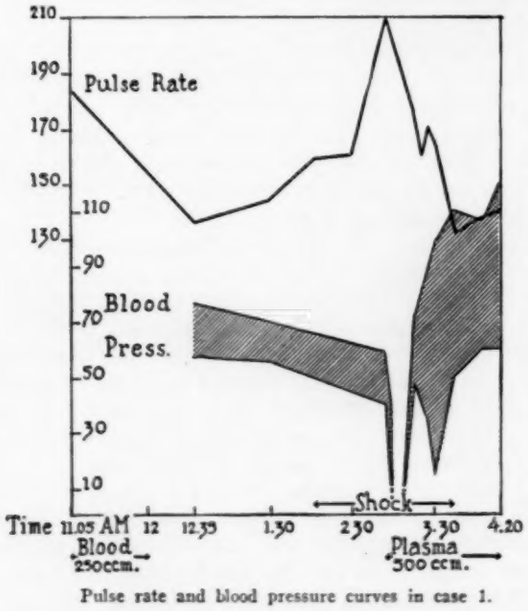
the United States is variously placed at from 0.13 per cent by Tiber [15] to 0.20 per cent by DeGowin.[16]

Bond and Wright [17] employed lyophile serum in the treatment of experimental shock in animals. They concluded that serum is capable of raising and maintaining the blood pressure for several hours. More recently Levinson,[18] employing serum in dogs, found it an effective agent in combating secondary shock resulting from severe hemorrhage. Mahoney,[12] employing lyophile plasma in the treatment of experimental shock in animals, concluded that it was more efficient than blood, physiologic solution of sodium chloride or acacia solution in restoring the normal blood pressure. Elliott [19] and Lehman [20] mentioned the use of plasma in the treatment of shock. McClure [21] used plasma and/or serum to restore the loss of blood plasma in burns. Fantus [22] suggested the use of plasma in shock without hemorrhage, in burns and in certain hemorrhagic conditions. No statement is made as to its actual use. Darrow [23] mentions the use of blood or plasma in shock.



Pulse rate and blood pressure curves in case 1.

More recently Brodin and Saint Girons [24] stressed the use of plasma in severe hemorrhage. The use of plasma in the treatment of shock is also reported by Tatum and his associates.[25]

It will be noted that most of the experimental workers who are cited used serum. We have pointed out the many advantages of citrated plasma over serum.[26] They may be briefly summarized as, first, the greater yield of the fluid portion when citrated plasma is separated by centrifugation, and, second, the all important freedom from reactions, often severe, occurring when serum is employed intravenously.[26]

In the present work citrated plasma was used exclusively. Details for the separation of plasma are given elsewhere.[26] Briefly, blood is mixed with a 2 per cent solution of sodium citrate in physiologic solution of sodium chloride in the proportion of 100 cc. of citrate-saline solution to 500 cc. of blood. Plasma is separated by suction after centrifugation and may be used fresh or stored at 4 C. after addition of merthiolate solution 1:10,000. Practically, at the Bryn Mawr Hospital most of the plasma is a by-product of the blood bank. At the end of five days of preservation the plasma is separated, pooled and stored. No cross matching is necessary, but of course each lot is tested serologically by means of the Wassermann and Kahn tests.

The following are abstracts of reports of ten typical clinical cases selected out of a large number:

REPORT OF CASES

CASE 1.—A white woman aged 30 was admitted to the hospital with a diagnosis of multiple fibromyomas. Myomectomy was performed and the patient left the operating room at 10:40 a. m. in good condition; at 11:05 her pulse rate was 184 and her respiratory rate 24 a minute. Because of a slight loss of blood during the course of the operation a transfusion of 250 cc. of citrated blood was started. At 1:30 p. m. her pulse rate was 144 and her blood pressure 70 systolic, 56 diastolic. The patient became progressively weaker and at 2:55 her pulse rate was over 200 and her blood pressure 59/40. In the succeeding ten minutes her blood pressure was not obtainable and the patient appeared in a state of deep shock (the course of the pulse and blood pressure is shown in the chart). At 3 o'clock 500 cc. of a solution consisting of equal parts of plasma and physiologic solution of sodium chloride was started intravenously in conjunction with routine measures. At 3:30 the patient had received 500 cc. of the mixture and was decidedly improved; the pulse rate was 164 and the blood pressure 100/60. The patient steadily improved from shock and made an uneventful recovery.

CASE 2.—A white woman aged 34 had a cholecystectomy performed for chronic cholecystitis with cholelithiasis on Sept. 18, 1939, and was returned to the ward in good condition at 12:50 p. m. At that time her pulse was 120 and her blood pressure 164/116. She was given a total of 2,000 cc. of 5 per cent dextrose in physiologic solution of sodium chloride intravenously between 12:50 and 7:30, together with morphine sulfate one-sixth grain (0.01 Gm.) but her blood pressure steadily fell, so that at 7:30 it was 104/78 and her pulse rate 126. At 10 o'clock her blood pressure was not obtainable and she showed all the clinical signs of severe shock and was given routine treatment. At midnight she was adjudged critically ill. The blood pressure was still not obtainable and the pulse rate was 140 a minute. At 12:20 a. m. 250 cc. of undiluted plasma was begun, which was absorbed at 1:15, and then an equal quantity of citrated blood was started. At this time, her pulse rate was still 144, but her blood pressure was now 105/84 and the general conditions were definitely improved. At 2 o'clock the patient became rational and rapidly recovered from the state of severe postoperative shock.

CASE 3.—A white woman aged 58 was admitted to the hospital at 12:30 p. m., Dec. 16, 1938, with acute intestinal obstruction. At that time her pulse rate was 100 and her blood pressure 88/54. Her white cell count was 15,300 with 76 per cent polymorphonuclear neutrophils, blood urea nitrogen 62 and carbon dioxide combining power 42 volumes per cent. She was

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treated with the Wangensteen drainage and in the routine manner for shock. At 9 o'clock she had received 2,000 cc. of 5 per cent dextrose in physiologic solution of sodium chloride intravenously and was taken to the operating room for laparotomy under spinal anesthesia, at which time her blood pressure was 95/60. A large volvulus was found which necessitated the resection of approximately 240 cm. of small intestine. At 9:35, during the course of the operation, her blood pressure fell to 40/30 and at times was not obtainable. The patient appeared clinically in a state of shock. At this point the administration of 500 cm. of plasma plus 300 cc. of physiologic solution of sodium chloride was begun intravenously. The operation was finished at 10:25, at which time the blood pressure was 150/60. The patient made a complete recovery from the state of shock.

CASE 4.—A white man aged 45 was admitted to the accident ward at 7:50 p. m., Nov. 16, 1939, with a diagnosis of perforated peptic ulcer. At 9 o'clock his blood pressure was 80/20 and his white cell count was 12,750 with 85 per cent polymorphonuclear neutrophils. An x-ray examination showed free gas beneath the diaphragm. The patient was taken to the operating room at 10 o'clock for laparotomy under spinal anesthesia. During the course of the operation his blood pressure fell to 30/10 and 5 per cent dextrose in physiologic solution of sodium chloride was begun intravenously. The operation was completed at 11 o'clock and by midnight the patient had received 2,000 cc. of the dextrose-saline solution. The blood pressure at this point was 90/48. The pulse was weak, with a rate of 100 a minute; the patient was profusely perspiring and appeared to be in a state of shock. Two hundred and fifty cc. of plasma diluted with 500 cc. of saline-dextrose solution was given intravenously and at 2:15 a. m. the blood pressure was 120/80 and the patient had definitely recovered from the state of shock.

CASE 5.—A white man aged 63 was brought to the accident ward at 11:30 a. m. on June 1, 1939, after he had been picked up by the claws of a steam shovel and dropped into a truck with dirt and stones. He had fractures of twelve ribs with hemothorax, and compound fractures of the right tibia and fibula. He immediately received routine prophylactic treatment for shock. On return from the x-ray department at 12:30 p. m. his pulse rate was 64 and his blood pressure 94/54. He was given 1,000 cc. of 5 per cent dextrose in physiologic solution of sodium chloride intravenously and at 3:30, although his blood pressure was still 98/50, he appeared clinically in shock. Five hundred cc. of undiluted plasma was started intravenously. At 4 o'clock his blood pressure was 110/50 and at 6:30 it was 130/50, by which time the clinical manifestations of shock had disappeared.

CASE 6.—A white boy aged 11 years was brought to the accident ward at 3 p. m., April 7, 1939, having suffered a traumatic amputation of both legs above the knees, with considerable loss of blood. The patient was given external heat, morphine sulfate one eighth grain (0.008 Gm.) and 5 per cent dextrose in physiologic solution of sodium chloride intravenously. At 3:40 the pulse rate was over 140, the respiratory rate 28 and the blood pressure 58/40, and the patient appeared to be in a state of shock. Débridement without anesthesia and the intravenous administration of plasma diluted with an equal amount of physiologic solution of sodium chloride were started. At 4 o'clock, on leaving the operating room, the pulse rate was still over 140, but the blood pressure was 67/40. At 4:25 the patient had received 300 cc. of plasma, at which time the pulse rate was 132 and respiratory rate 28. The blood pressure at 4:45 was 110/40 and the patient was definitely improved. Blood having become available in the meantime, a transfusion of whole blood was begun. The child was completely recovered from shock by 5:30, long before the transfusion was completed.

CASE 7.—A white man aged 77 was admitted to the hospital with the diagnosis of benign prostatic hypertrophy. A first stage suprapubic cystostomy was performed on August 8, followed by prostatectomy under spinal anesthesia on August 21. The operation was successful and the patient was returned to his room in good condition at 3:30 p. m. The pulse rate was 120 and the blood pressure 124/64. Between 3:30 and 6 o'clock the patient complained of a chilly sensation and his pulse became weaker. There was moderate bleeding from the wound. At 6 o'clock the pulse rate was 160, the blood pressure 40/? and clinical signs of shock were present. The bladder was immediately packed and shortly thereafter, in conjunction with the routine care, the administration of undiluted plasma was begun intravenously. At 7:30, 650 cc. of plasma had been administered and the patient was definitely improved, the pulse rate being 160, but of better volume, and the blood pressure having risen to 65/40. At this time, whole blood being available, its administration was begun. The patient recovered from the state of shock.

CASE 8.—A white man aged 72 was admitted to the accident ward at 11:55 p. m. on Oct. 19, 1939. He had been struck by an automobile and had suffered comminuted fractures of both bones of both lower legs. The fractures of the left leg were compound and required subsequent amputation of the leg. There was a moderate loss of blood. The patient was in a state of alcoholic intoxication, irrational and in profound shock. He was treated in the routine manner and at 1:10 a. m., when in a critical condition, intravenous administration of 500 cc. of undiluted blood plasma was started. At this time the patient was pulseless and blood pressure was not obtainable. At 1:30 his temperature was 95 F. and the blood pressure 40/24. At 2 o'clock the 500 cc. of blood plasma had been absorbed, the patient's condition was greatly improved, his respiratory rate being 28 per minute and his blood pressure 40/32. At the same time transfusion of 500 cc. of whole blood was begun. His progress continued satisfactorily and he made a complete recovery from the state of shock.

CASE 9.—A white woman aged 35, extremely obese (137 cm. in height and weighing 127 Kg.), was admitted to the accident ward at 10:15 a. m., March 21, 1939, after she had been in labor twenty-four hours. Her membranes had ruptured seventy-two hours previously, her uterus was ruptured and she also had a strangulated, incarcerated ventral hernia. Examination on admission showed a temperature of 99.4 F., a pulse rate of 116 and a blood pressure of 132/82. The patient was given 1,500 cc. of 5 per cent dextrose in physiologic solution of sodium chloride and taken to the operating room at 7:30 p. m. Her pulse rate was then 134 and the blood pressure had dropped to 115/30. With the advance knowledge of a prolonged operation on an extremely obese, exhausted woman, with previous hemorrhage and extensive necrotizing lesions, and the immediate danger of shock and the possibility of its prevention, the patient was given 750 cc. of undiluted plasma intravenously during the course of the operation; that is, between 7:40 and 10:15. During the operation her blood pressure rose to 160/110 (nearly her normal), and the patient made an uneventful recovery.

CASE 10.—A white youth aged 18 was admitted to the accident ward on Nov. 18, 1939, at 4:45 p. m. He had a compound fracture of the left ankle with considerable loss of blood, the result of a motorcycle accident. On admission, his blood pressure was 124/90 and the pulse rate was 88. He was treated prophylactically for shock in the routine fashion and after roentgenographic examination was sent to the operating room for débridement under gas-ether anesthesia at 6:35. At this time the pulse rate was 120 and the patient was clinically in a state of mild shock. At 8 o'clock he was given 1,000 cc. of a solution consisting of equal parts of plasma and physiologic solution of sodium chloride; at 9 o'clock the pulse rate was 110, with good volume, the blood pressure was 130/98 and the clinical signs of shock had disappeared.

Cases 1 to 4 are instances of postoperative shock not accompanied by excessive loss of blood. The administration of plasma initiated rapid recovery in all cases and was sufficient in itself to complete recovery in three of them. In case 2 the administration of 250 cc. of plasma caused a very definite improvement in the patient's condition. The treatment was continued with the administration of 250 cc. of blood, although plasma alone would probably have had a similar effect. It is

to be noted that in case 1 a transfusion of 250 cc. of whole blood did not prevent the onset of severe shock and that in cases 3 and 4 the intravenous administration of 2,000 cc. of 5 per cent dextrose-saline solution had apparently no effect in preventing shock.

Case 5 is a typical instance of severe traumatic shock without visible loss of blood, rapid and complete recovery following administration of plasma alone.

Case 6 is an instance of traumatic shock accompanied by severe loss of blood. Administration of plasma rapidly and efficiently contributed to the restoration and maintenance of the circulation until whole blood was made available. It is to be noted however that, even in the presence of severe hemorrhage, plasma alone was sufficient to combat shock.

Cases 7 and 8 are instances of postoperative shock and traumatic shock, respectively, with relatively small losses of blood. In both cases plasma efficiently contributed to initiate and maintain recovery until whole blood was made available. It is very likely that in both cases the administration of whole blood was superfluous.

Cases 9 and 10 represent the very numerous types of cases in which the traumatic lesion is of such a nature and extent that it often leads to shock. One of the two cases (case 10) actually presented clinical evidence of early shock. The administration of plasma in these cases, particularly before operation, eliminates the danger of sudden postoperative collapse.

Routine treatment for shock referred to in these reports consists essentially of placing the patient in the Trendelenburg position, the application of heat, the administration of a narcotic and usually the intravenous administration of physiologic solution of sodium chloride with 5 per cent dextrose. This routine treatment, without the intravenous administration of plasma or whole blood, has on many occasions proved insufficient in the treatment of shock.

Concerning the dosage, it may be generally stated that it must be sufficiently large to relieve entirely the symptoms of shock. The average dose is about 500 cc., but larger doses may be necessary in cases of severe involvement. The size of the patient and the severity of the circulatory deficiency are the factors determining the size of the dose.

The speed of administration depends also to a certain extent on the condition of the patient. It may be stated that it is safe to administer plasma by the gravity method, a gage 19 needle being used as fast as it will run, approximately 10 cc. a minute. We prefer generally to use the plasma diluted with an equal amount of saline-dextrose solution; this is, however, not essential.

Heating of the plasma in any way is to be carefully avoided. Administration of cold plasma does not cause any reaction. For other details concerning the use of plasma the reader is referred to our previous paper.[26]

SUMMARY AND COMMENT

Plasma appears to be from all standpoints the ideal material for the permanent reestablishment of proper circulation in secondary shock. Because of the protein content and the consequent high colloidal osmotic pressure,[27] plasma does not leave the circulation, as crystalloid solutions do, and therefore with its use it is possible to regulate effectively the volume of circulating blood. The advantages of plasma may be summarized as follows:

1. It is readily obtained from citrated blood by the simple process of centrifugation, with a high yield of the liquid phase. It can be pooled and stored for use after the necessary serologic tests for syphilis are carried out. When a blood bank is in operation, plasma can be separated on expiration of the useful period of preservation, preferably five days. With reasonable care, sterility tests are not necessary.

2. It is always ready for immediate use, without preliminary preparation, such as typing and cross matching.

3. Its use is simple, safe and free of reactions. Very large and repeated doses at any interval of time can be given without untoward effect.

4. It can be readily transported, as it is not affected by shaking, and can be preserved in a variety of ways. With the addition of a preservative (merthiolate solution 1:10,000), it can be kept at room temperature for a number of days. At 4 C. the protein content of plasma, and therefore its antishock properties, can be preserved for months. In the frozen state it can be preserved for even a longer period. Finally, reduced to a dry powder by desiccation from the frozen state ("lyophile" or "cryochem" process[28]), it can be kept for an indefinite period of time and readily prepared for use by regeneration with distilled water.

5. It does not add to concentration of erythrocytes.

6. Its practical use in secondary shock has shown its efficiency in the rapid restoration of proper circulation in cases of the most severe involvement, even those accompanied by a very large loss of blood. The latter point, emphasized by Levinson,[18] is very important. In cases of severe hemorrhages the loss of erythrocytes is a relatively secondary factor, one which contributes but little to the state of shock, provided the volume of circulating blood is maintained at a proper level. Case 6 exemplifies this type of case.

With the use of plasma it is possible to avoid altogether the emergency blood transfusion, with its unavoidable serious delays and the dangers due to hurried preparations, often at the hands of improperly trained persons, and to the rapid administration. A suggested routine is to administer to all patients with severe injuries, regardless of the loss of blood, sufficient plasma to secure recovery from shock or, if shock is not present, to prevent its occurrence. Later on, when blood dilution has taken place, the actual degree of anemia can be estimated, and transfusion with whole blood resorted to if considered essential to recovery or, as more commonly occurs, useful to shortening the period of convalescence. In the average hospital the establishment of a plasma bank with preservation of the material at 4 C. is a simple and efficient method for the maintenance of an adequate supply on hand. As already stated, if a blood bank is in operation plasma can be separated from the lots of blood that have not been used within the maximum period of preservation. A plasma bank, however, is readily operated and useful even in smaller institutions where establishment of a blood bank is not practicable.

Whenever large quantities of plasma need to be stored over a long period or transported under adverse conditions, the advantages of the preservation by drying from

27. Freeman, N. E., and Wallace, W. M.: The Effect of Concentrated Serum on Plasma Volume and Serum Protein Concentration, Am. J. Physiol. **124**: 791 (Dec.) 1938.

28. Flosdorf, E. W., and Mudd, Stuart: Procedure and Apparatus for Preservation in Lyophile Form of Serum and Other Biological Substances, J. Immunol. **29**: 389 (Nov.) 1935; An Improved Procedure and Apparatus for Preservation of Sera, Micro-Organisms and Other Substances—the Cryochem-Process, ibid. **34**: 469 (June) 1938.

the frozen state ("lyophile" or "cryochem" process) are self evident. (Elser, Thomas and Steffen;[29] Flosdorf and Mudd[28]). We have pointed out that the reactions, reported by several observers,[26] following the administration of "lyophile" serum intravenously are due not to a change induced by the process of desiccation but to the use of serum. Lyophile or cryochem plasma causes no reactions. Desiccated serum when administered intravenously in a concentrated form has also been found effective in reducing the intracranial pressure (Hughes, Mudd and Strecker;[30] Wright, Bond and Hughes[31]).

World War experience has pointed out that shock plays an important role in the high death rate occurring during the first twelve hours after injury. Under the conditions of life of soldiers in first line duty, during prolonged action, shock is particularly apt to occur, because of the state of depleted reserves from which most of the men suffer, together with the abnormal nervous conditions. This observation has been repeatedly made. Robertson,[32] together with many other investigators, studied the problem during the World War, and he is usually credited as having been the first to use refrigerated preserved blood for transfusions. Of the twenty patients treated, nine died. During the recent Spanish civil war refrigerated blood was extensively used in combating shock.[33] A true estimate of its usefulness is lacking. We have already pointed out some of the drawbacks to the use of refrigerated blood. On the field these difficulties would become tenfold greater. The use of type O blood exclusively is only a partial help. The most serious difficulty is offered by the problem of preservation of the blood and of transportation, since it is well known that agitation of preserved refrigerated blood readily causes hemolysis. Under these conditions the advantages offered by the use of plasma, preserved in any of the ways mentioned, appears obvious. The same may be said of its use in disasters involving similar field work. Heinatz and Sokolow[34] found that plasma can be preserved for three months and recommend that plasma of the AB group be kept on hand in all hospitals.

CONCLUSIONS

1. The intravenous administration of citrated blood plasma has proved to be an ideal means of restoring an adequate blood circulation in patients suffering from secondary shock, rapidly relieving the clinical manifestations.

2. The advantages offered by citrated blood plasma are that: (*a*) it can be readily prepared and safely transported, (*b*) it can be stored for an indefinite period of time, (*c*) it is entirely safe and free from reactions, (*d*) it can be used in large and repeated doses, (*e*) it is ready for instant use, and (*f*) it does not add to concentration of erythrocytes if this condition is present.

29. Elser, W. J.; Thomas, A. R., and Steffen, G. I.: The Desiccation of Sera and Other Biological Products, Including Micro-Organisms, in the Frozen State with Preservation of the Original Qualities of Products So Treated, J. Immunol. **28:** 433 (June) 1938.

30. Hughes, Joseph; Mudd, Stuart, and Strecker, E. A.: Treatment of Increased Intracranial Pressure by Concentrated Human Lyophile Serum, Tr. Am. Neurol. A. **62:** 118, 1936; Reduction of Increased Intracranial Pressure by Concentrated Solutions of Human Lyophile Serum, Arch. Neurol. & Psychiat. **39:** 1277 (June) 1938.

31. Wright, David; Bond, Douglas, and Hughes, Joseph: Reduction of Cerebrospinal Fluid Pressure by Concentrated Lyophile Serum, Arch. Neurol. & Psychiat. **39:** 1288 (June) 1938.

32. Robertson, O. H.: Transfusion with Preserved Blood Cells, Brit. M. J. **1:** 691 (June 22) 1918.

33. Maisonnet and Jeanneny: Use of Refrigerated Blood for Armies, Paris letter, J. A. M. A. **111:** 1311 (Oct. 1) 1938.

34. Heinatz, S. W., and Sokolow, N. I.: Plasma Transfusion as Method of Choice in Treatment of Hemolytic Shock, Zentralbl. f. Chir. **62:** 1753 (July 27) 1935.

Clinical Notes, Suggestions and New Instruments

THE PROTHROMBIN CHANGES IN BANKED BLOOD

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Technical Assistant
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The use of refrigerated blood is of intense interest to most physicians and at the present time a scheme for its management has been worked out. From the beginning of the use of such blood at the Mayo Clinic the amount of blood in the refrigerator at any one time has been minimized to a small enough quantity so that each day or two fresh blood will be collected and placed in the refrigerator. It is only occasionally that blood which has been in the icebox for many days is used. The desire to study the quality of older blood and relatively fresh blood has led us to investigate several properties of blood and how they are altered by short chilling and prolonged chilling. The blood is citrated and kept in the refrigerator at a temperature of 34 F. in a 500 cc. container used for intravenous administration. An interesting report on the prothrombin time of banked blood by Rhoads and Panzer[1] dealt with prothrombin time as estimated by a modification of Quick's method. It was thought best to check the results with those obtained by another method.

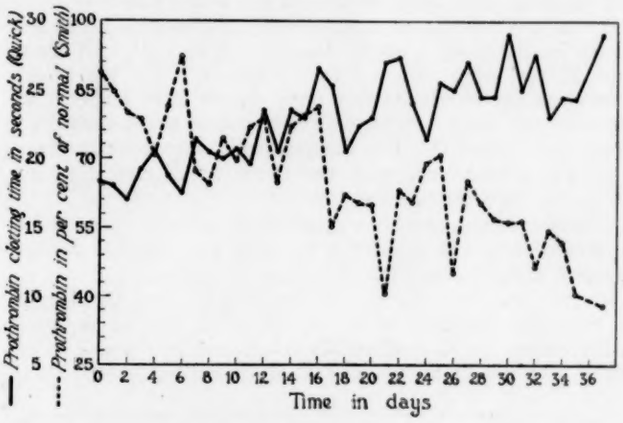

Chart 1.—Average prothrombin clotting time and percentage of prothrombin for each day.

The quantitative method for titration of prothrombin in blood, as developed by Smith and his associates,[2] has been employed by us for some time. Simultaneous determinations of prothrombin coagulation time, as described by Quick and his co-workers,[3] have been made in nearly every instance with a fair degree of correlation.

In determining the prothrombin content in relation to the clotting time, a slight modification in technic was necessitated since the blood already had been citrated. In this work all blood used for normal controls was citrated in the same proportion as the banked blood. The percentage of prothrombin obtained was slightly less than that obtained with oxalated specimens of the same blood, owing possibly to the difference

From the Section on Clinical Biochemistry, the Mayo Clinic (Dr. Osterberg).

1. Rhoads, J. E., and Panzer, L. M.: The Prothrombin Time of "Bank Blood," J. A. M. A. **112:** 309-311 (Jan. 28) 1939.

2. Warner, E. D.; Brinkhous, K. M., and Smith, H. P.: A Quantitative Study on Blood Clotting: Prothrombin Fluctuations Under Experimental Conditions, Am. J. Physiol. **114:** 667-675 (Feb.) 1936. Smith, H. P.; Warner, E. D., and Brinkhous, K. M.: Prothrombin Deficiency and the Bleeding Tendency in Liver Injury (Chloroform Intoxication), J. Exper. Med. **66:** 801-811 (Dec.) 1937.

3. Quick, A. J.; Stanley-Brown, Margaret, and Bancroft, F. W.: A Study of the Coagulation Defect in Hemophilia and in Jaundice, Am. J. M. Sc. **190:** 501-511 (Oct.) 1935.

in dilution and to the presence of the citrate. However, the difference was less than 10 per cent and all results still held their same relative values in comparison with normal controls.

At the time of obtaining 500 cc. of blood from the donor, samples of 10 cc. each were drawn into sterile test tubes and kept in the refrigerator for from one to thirty-seven days.

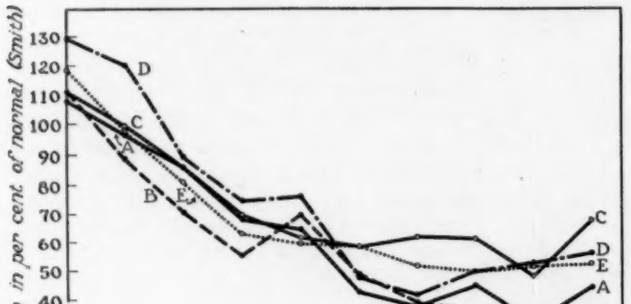

Chart 2.—Changes in prothrombin content of five specimens through thirty-six days.

When the allotted time had elapsed, the prothrombin content of the blood was determined by both the methods of Quick and of Smith and his associates as previously mentioned.

It was not possible to examine each specimen of blood for the entire thirty-seven days. However, 129 samples of blood were titrated after different time intervals. For the initial determinations, eleven samples were tested; from the first to the tenth day from four to five samples were tested each day; from the eleventh to the thirty-seventh day three samples were tested each day, with the exception of five days on which only two samples were available.

The average prothrombin coagulation time and the percentage of prothrombin was calculated for each day and the results obtained with both methods are shown in chart 1.

In spite of daily fluctuations in values, when the length of storage is increased there is observed a gradual decrease in the percentage of prothrombin determined by the method of Smith and his associates and a corresponding prolongation

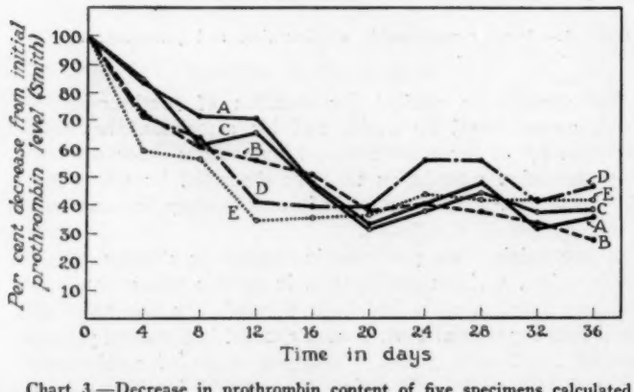

Chart 3.—Decrease in prothrombin content of five specimens calculated on basis of initial value of 100 per cent.

of prothrombin coagulation time is shown by the method of Quick. The percentage of prothrombin decreased from an initial average titration of 89 to 38 on the thirty-seventh day. The prothrombin time rose from an initial clotting time of eighteen seconds to twenty-nine seconds on the thirty-seventh day.

The correlation between the two methods is rather good, the variations obtained being largely accounted for by technical difficulties in the method itself.

This led to further experimentation in which five specimens of blood were tested for prothrombin content every four days for thirty-six days. The specimens of 100 cc. were divided into smaller samples in sterile test tubes and kept in the refrigerator under conditions similar to those in the case of banked blood. The prothrombin content was determined on each sample of fresh blood by the quantitative method (Smith and his associates).

The original hematocrit reading for each specimen was used in calculating the dilution factor throughout the experiment. Furthermore, the blood of the same individual was used for the normal control for each titration. In this way it was hoped to standardize the conditions of the test and to limit the variables to those in the method itself.

The changes in prothrombin content during the thirty-six days for each of the five specimens of blood are shown in chart 2. The prothrombin content is expressed as percentage of prothrombin present in comparison with a normal control for each day of titration.

To express these data in an additional manner, the percentage of decrease calculated on the basis of the initial value as 100 per cent is shown in chart 3.

Similar curves were obtained in these two instances and show a rapid decrease in prothrombin content during the first twelve days and a gradual leveling off at approximately 40 per cent thereafter.

While these data do not show as rapid a decrease in prothrombin content in banked blood as given by Rhoads and Panzer, it is demonstrated conclusively that a decrease does occur over a period of time to a level of 40 per cent of the original content. Hence it is concluded that, in cases in which it is desired to raise the prothrombin content of the blood by transfusion, old banked blood is not a suitable agent.

THE PROTHROMBIN IN PRESERVED BLOOD

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It has been repeatedly found in my laboratory that, when normal oxalated blood is placed in an ordinary refrigerator, a reduction of the prothrombin, occasionally as much as 50 per cent, may occur in twenty-four hours. Rhoads and Panzer,[1] using my method, have noted that even when blood is carefully preserved at 4 C. the prothrombin rapidly decreases. Lord and Pastore,[2] employing the method of Warner, Brinkhous and Smith,[3] found on the contrary that the prothrombin was relatively little diminished in stored blood. Obviously a marked discrepancy exists between the two methods for determining prothrombin and this presents a problem which is not only of academic but of practical clinical importance as well.

Without entering into the question of the merits and defects of the two methods, it must be pointed out that both tests are based on unproved assumption; therefore the validity of the results which they yield can be judged only by correlation with clinical observation. The immediate question to be considered is whether the decrease in prothrombin observed by my method is real or apparent.

Several factors can cause a prolonging of the "prothrombin time": (1) alteration of the fibrinogen, (2) formation of anticoagulants and (3) changes in the prothrombin itself. To ascertain whether the first or second factor is the basic cause of the prolonged coagulation time it is merely necessary to determine the clotting time obtained when a standard thrombin solution is added to plasma. By my adaptation[4] of Eagle's method, a potent solution of thrombin can be readily prepared.

From the Department of Pharmacology, Marquette University School of Medicine.

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2. Lord, J. W., and Pastore, J. B.: Plasma Prothrombin Content of Bank Blood, J. A. M. A. **113**: 2231 (Dec. 16) 1939.
3. Warner, E. D.; Brinkhous, K. M., and Smith, H. P.: A Quantitative Study on Blood Clotting: Prothrombic Fluctuations Under Experimental Conditions, Am. J. Physiol. **114**: 667 (Feb.) 1936.
4. Quick, A. J.: On the Action of Heparin and Its Relation to Thromboplastin, Am. J. Physiol. **115**: 317 (April) 1936.

The results recorded in table 1 indicate that thrombin produces coagulation nearly as effectively in old as in fresh plasma. It can be concluded therefore that neither is the fibrinogen appreciably altered in activity nor is a significant amount of antithrombin or anticoagulant formed during the first forty-eight hours. In older bloods, nevertheless, it is quite likely that changes may occur which will interfere with the accurate quantitative determination of prothrombin.

It seems fairly certain that the delayed prothrombin time is primarily the result of changes in the prothrombin itself. The simplest explanation is that a quantitative decrease in the prothrombin occurs.

Before interpreting the results obtained by my method, it is desirable to restate the principle on which the test is based. The clotting time of recalcified oxalated plasma when mixed with an excess of thromboplastin and a fixed amount of calcium is a quantitative measure of the prothrombin concentration. The values of the clotting time in terms of prothrombin concentration are given in table 2. If the clotting time of a specimen of plasma is fifteen seconds, the prothrombin concentration is 50 per cent according to this method. If such a plasma is diluted with an equal volume of physiologic solution of sodium chloride it will have a prothrombin content of 25 per cent and should clot in twenty-one seconds. The data in table 3 were obtained by determining the clotting time of undiluted and diluted plasma. The fairly good agreement between the expected and the observed clotting times of diluted plasma is evidence in favor of the conclusion that a true decrease of prothrombin occurs.

Another simple means of verifying whether the prolonged "prothrombin time" is due to a quantitative reduction of prothrombin is to mix stored plasma with varying proportions of fresh plasma and then determine the coagulation times of the mixtures. If a true reduction of prothrombin exists, the clotting times of the mixtures should correspond to the calculated concentrations of prothrombin. A typical experiment is recorded in table 4. The agreement between the observed and the calculated values of prothrombin furnishes further proof that the decrease of prothrombin in stored blood is real.

It is not surprising that a reduction of prothrombin should occur in preserved blood. The fact that heating plasma to 56 C. will destroy most of the prothrombin in fifteen minutes demonstrates the labile nature of this substance. It has recently been observed in my laboratory that the prothrombin of goose blood which is carefully collected and kept in a paraffined container remains unchanged for several days, whereas in oxalated goose blood the prothrombin decreases even more rapidly than in human blood. It appears that the removal of calcium somehow decreases the stability of the prothrombin molecule. Further study may perhaps lead to the evolving of a method for preserving blood without loss of prothrombin.

At present it seems wise to depend exclusively on fresh blood for controlling bleeding in the jaundiced patient. Such cases present an emergency which requires prompt and effective treatment. The bleeding can be controlled by giving fresh citrated blood, as I as well as others have demonstrated. Interestingly, in the case which I [5] described the prothrombin before one transfusion of 550 cc. of blood was 8 per cent of normal and 20 per cent immediately after the blood was given. The amount of blood injected was sufficient to elevate the prothrombin just above the hemorrhagic level. Had the patient been given stored blood with a prothrombin content of 50 per cent, the calculated prothrombin rise would have been approximately 6 per cent, or an elevation to only 14 instead of 20 per cent. Obviously such a transfusion would not have profited the patient.

With the proper treatment of the jaundiced patient preoperatively by the administration of vitamin K and bile salts and by the recognized methods for increasing hepatic function, bleeding is now rarely encountered. If hemorrhage does occur, the surgeon is not justified to gamble by giving stored blood unless fresh blood is not obtainable.

TABLE 1.—*The Clotting Time of Fresh and Preserved Plasma by Thrombin*

	Clotting Time in Seconds *			
Concentration of thrombin †..	1	1/5	1/10	1/20
Fresh plasma I.....	3	7	11-12	18
Fresh plasma II.....	3	7	11-12	17
Plasma 48 hours old I.....	3	7-8	11½-12½	18-19
Plasma 48 hours old II.....	3	8	12-12½	19-20

* The clotting time was determined by mixing 0.2 cc. of plasma with 0.1 cc. of the thrombin solution.

† Dilutions of thrombin were made with distilled water.

TABLE 2.—*Values of the Clotting Time in Terms of Prothrombin Concentration*

Prothrombin Concentration, per Cent	Clotting Time,* Seconds
100	11-12
80	12½
60	13½
50	15
40	17
30	19
25	21½
20	25
10	38
5	65

* Plasma 0.1 cc. mixed with thromboplastin solution 0.1 cc. and 0.025 molar calcium chloride 0.1 cc.

TABLE 3.—*Data Obtained by Determining the Clotting Time of Undiluted and Diluted Plasma*

Age of Plasma, Hours	Clotting Time of Undiluted Plasma, Seconds	Concentration of Prothrombin (from Table 2), per Cent	Clotting Time of Diluted Plasma,* Seconds	Concentration of Prothrombin (from Table 2), per Cent
1	12	100	15	50
24	15	50	21	25
24	14	58	18	35
24	14	58	19	30
24	16	45	21	25
48	18	35	27	17
48	17	40	24	21

* Plasma diluted with an equal volume of physiologic solution of sodium chloride.

TABLE 4.—*Results of a Typical Experiment*

	Prothrombin Time (Quick), Seconds	Concentration of Prothrombin	
		From Table 2, per Cent	Calculated,* per Cent
Stored plasma (72 hours old).....	21-22	25	
Fresh plasma.....	11½	100	
Stored plasma, 1 part) Fresh plasma, 1 part).....	14	58	62½
Stored plasma, 9 parts) Fresh plasma, 1 part).....	18	35	32½

* On the basis that stored plasma contained 25 per cent and fresh plasma 100 per cent of prothrombin.

SUMMARY

Evidence indicates that the prothrombin of decalcified blood diminishes on standing and supports the conclusion of Rhoads and Panzer that stored blood is inferior to fresh blood for controlling bleeding in jaundice.

561 North Fifteenth Street.

5. Quick, A. J.: The Nature of the Bleeding in Jaundice, J. A. M. A. **110:** 1658 (May 14) 1938.

PULMONARY EMBOLISM FOLLOWING THE INJECTION TREATMENT OF VARICOSE VEINS

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Numerous authors report a low incidence of serious complications following the injection therapy of varicose veins. McPheeters [1] has reported seven deaths in a series of 53,000 cases. Four of these were due to embolism. Silverman [2] collected nineteen cases of embolism from the literature and added one case of his own. In his series there were fifteen deaths and five recoveries. Kettel [3] reported ten deaths due to embolism in a series of 60,000 cases. Westerborn [4] has recently reported eleven deaths from embolism in a series of 30,000 cases; he also mentions fifty-three additional cases of embolism. Probstein [5] reported two cases of anaphylaxis and three of embolism with no deaths. Kilbourne [6] collected a series of twenty deaths due to emboli and other causes. An occasional death from allergy has been reported.[7]

We believe that embolism is the most common cause of death following the injection treatment of varicose veins. Its occurrence is one of the most dreaded catastrophes in surgery. The patient who has felt well suddenly complains of severe pain in the chest, air hunger and the fear of impending death. Respirations are rapid and shallow. Pallor or cyanosis with engorgement of the superficial veins of the neck soon appears. The pulse is rapid and thready. Death may ensue in a few minutes. Most emboli develop from six to ten days after the injection. There are on record, however, three cases in which embolism occurred within a few minutes after the veins were injected.[8]

The etiologic factors in embolus formation include bed rest and infection. It is probable that continuous bed rest predisposes to most of the emboli, the danger of bed rest being that it favors the development of venous stasis and a resultant thrombophlebitis from which most emboli are thought to arise. The role of infection in embolism has been pointed out by de Takats.[9] Kilbourne [6] emphasizes the necessity of employing a sterile technic for the injections. He also believes that bactericidal solutions should be used and points out that eleven of the twenty patients with embolism in his series were injected with nonbactericidal solutions. Westerborn,[4] on the other hand, shows that in some cases emboli develop when bactericidal solutions are used. Sodium morrhuate and most of the other fatty acid preparations in use today are only weakly bactericidal. Occasionally an embolus will develop even though the patient has remained ambulatory after the injections and in spite of the fact that no evidence of phlebitis exists,[10] indicating that there are other etiologic factors than bed rest and infection. Silverman [2] believes that the use of a large volume of sclerosing solution is the cause of most emboli.

REPORT OF TWO CASES

A recent survey of the last 600 cases of varicose veins treated at the University Hospitals revealed that two deaths had resulted from embolism after injection therapy:

CASE 1.—A white woman aged 68 was admitted to the University Hospitals for treatment of large varicose veins which had been present in both lower extremities for twenty years. She gave no history suggestive of past or recent thrombophlebitis. She was moderately asthenic but her general health was good. Physical examination revealed a mild degree of arteriosclerotic heart disease. The blood pressure was 125 systolic, 80 diastolic. A dry shallow ulcer approximately 2 by 3 inches (5 by 7.5 cm.) in diameter was present on the lower medial aspect of each leg. The urine and blood studies including blood sugar and Wassermann tests were not remarkable.

On the day of admission the varicosities at three sites on the left extremity and two sites on the right extremity were injected with a solution of 50 per cent dextrose and 20 per cent sodium chloride. The amount of solution for each injection varied from 25 to 35 cc.

Two days later a red, swollen, indurated area was noticed on the left thigh at the site of the uppermost injection. The temperature was 102 F. The patient was therefore put to bed and ice packs were applied locally. Eight days later an abscess in this region was drained and hot wet dressings were applied. Her condition improved rapidly and the temperature returned to normal within twelve hours.

Fourteen days after the injection the patient suddenly had marked shortness of breath and a mild anterior thoracic pain which did not radiate. She rapidly went into shock, the blood pressure falling to 90 systolic, 70 diastolic, and the pulse rate rising to 150 a minute. Epinephrine and caffeine with sodium benzoate were administered subcutaneously. Three hours later the patient was greatly improved, the pain and dyspnea were less marked and the pulse rate was 100 a minute. However, she remained pale, weak and very nervous. Morphine was given for rest, and digitalis was started.

Two days after this episode the pulse rate was 90 a minute with a regular rhythm, and the blood pressure was 130 systolic, 80 diastolic. The temperature had begun to climb, however, and a diagnosis of bronchopneumonia was made.

Twenty days after the injections were made another episode of dyspnea, tachycardia and shock developed similar to the previous attack. From that time on the patient's course was retrograde and she died the next night.

Although a postmortem examination was not made, the clinical picture was one of pulmonary emboli with subsequent bronchopneumonia.

CASE 2.—A white woman aged 54, weighing 311 pounds (141 Kg.), was admitted to the University Hospitals for treatment of varicose veins, which had been present in the left leg for thirty-five years. She also complained of shortness of breath on exertion, but the physical examination of the heart and lungs was not remarkable. The blood pressure was 143 systolic, 96 diastolic. The left leg presented two masses of varicosities and a deep ulcer 4 cm. in diameter above the medial malleolus. The urine and blood studies including the Wassermann reaction of the blood were within normal limits.

On the day of admission one varicose vein on the left leg was injected with 3 cc. of a 5 per cent solution of sodium morrhuate. On the following day some inflammatory reaction was noticed in and about the ulcer. The patient was kept in bed and dry heat was applied to the legs. An obesity diet was also maintained. During the next nine days her course was uneventful except for slight pain in the left leg in the region of the varicosities.

On the tenth day after injection the patient was feeling well. She arose to be weighed and suffered a fainting spell, followed by severe pain in the chest associated with marked air hunger, cyanosis and a rapid pulse rate. Despite supportive measures she became worse, moist rales developed in both lung bases and she died thirty-one hours after the first untoward symptom.

At autopsy the pulmonary artery contained a large laminated antemortem thrombus. The lungs were congested and partly collapsed. The varicose veins above the ulcer showed an organizing thrombus. The heart was grossly normal.

COMMENT

Our experience in these two fatal cases of pulmonary embolism, occurring in a relatively small series of cases, leads us to believe that the dangers of this procedure are greater than is usually reported. A critical analysis of these cases reveals several common conditions. In neither case was the injection preceded by

From the Department of General Surgery, State University of Iowa College of Medicine.

1. McPheeters, H. O., and Rice, C. O.: Varicose Veins: Complications, Direct and Associated, Following the Injection Treatment: A Review of the Literature, J. A. M. A. **91:** 1090-1094 (Oct. 13) 1928.
2. Silverman, Isidore: The Incidence of Embolism in Treatment of Varicose Veins with Sclerosing Solutions: Report of a Fatality, J. A. M. A. **97:** 177-178 (July 18) 1931.
3. Kettel, Karsten: Fatalities Following Injection Treatment of Varices, Etiology and Pathogenesis of Emboli, Zentralbl. f. Chir. **58:** 1498-1510 (June 13) 1931.
4. Westerborn, A.: Ueber die Emboliegefahr bei Injektionsbehandlung von Varizen nebst einem Bericht über die in Schweden vorgekommenen Emboliefälle, Acta chir. Scandinav. **79:** 321-358, 1937.
5. Probstein, J. G.: Major Complications of Intravenous Therapy of Varicose Veins, J. Missouri M. A. **33:** 349-352 (Sept.) 1936.
6. Kilbourne, N. J.: Elimination of Certain Dangers in the Treatment of Varicose Veins, Am. J. Surg. **25:** 148-154 (July) 1934.
7. Shelley, H. J.: Allergic Manifestation with Injection Treatment of Varicose Veins: Death Following an Injection of Monethanolamine Oleate (Monolate), J. A. M. A. **112:** 1792-1794 (May 6) 1939.
8. Horn, O., and Foged, J.: Risk of Embolism in the Injection Treatment of Varices, Clinical and Experimental Study, Mitt. a. d. Grenzgeb. d. Med. u. Chir. **42:** 409, 1931. Kettel.[3]
9. de Takats, Geza: Thrombosis and Thrombophlebitis in Christopher, Frederick, editor: A Textbook of Surgery, ed. 2, Philadelphia, W. B. Saunders Company, 1939.
10. McPheeters and Rice.[1] Silverman.[2] Kettel.[3] Westerborn.[4]

a high saphenous ligation, a procedure which we now perform almost as a routine.[11] We have had no case of pulmonary embolus occurring after high saphenous ligation. Neither patient was kept ambulatory following the injections. The first patient was placed on complete bed rest because of a suppurative process, while the second was kept in bed because definite cardiac disturbance had to be ruled out. The latter patient complained of shortness of breath, which was unquestionably due to her obesity. Frank infection was present in the one. In the other pain and discomfort were present for several days following the injection, which suggests that some degree of inflammation was present. Chronic leg ulcers were present in both cases.

CONCLUSIONS

The available evidence indicates that certain precautions should be observed with the injection of varicose veins in order to avoid the development of pulmonary emboli:

1. A high saphenous ligation or other indicated surgical procedure should be performed before injection therapy.
2. The patient should be kept ambulatory after the injections.
3. Injecting of inflamed veins should be avoided.
4. A sterile technic should be carried out for the injections.
5. Sterile solutions should be used for the injections.
6. Small amounts of the sclerosing solution should be used.

PNEUMO-ENCEPHALOGRAPHIC AND ELECTRO-ENCEPHALOGRAPHIC LOCALIZATION OF AN EPILEPTOGENIC FOCUS

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JUDAH MARMOR, M.D., NEW YORK
AND
B. C. MEYER, M.D., ORANGEBURG, N. Y.

A case illustrating successful localization of an epileptogenic focus by pneumo-encephalogram is presented together with a confirmatory localization by electro-encephalogram. Conclusions were derived from the latter procedure independently of the clinical and pneumo-encephalographic observations.

Fig. 1.—Large pocket of air in frontal region revealed by pneumo-encephalography.

REPORT OF CASE

A white man aged 30, unmarried, was admitted to the Montefiore Hospital for Chronic Diseases on Sept. 11, 1938, with the complaint of epileptic seizures of four months' duration. Eight years before he had been thrown from a rapidly moving truck, sustaining a basilar skull fracture from which he made a slow but complete recovery. In April 1937 he was stated to have dislocated his right shoulder during sleep wherein he was heard to make "funny noises." Reduction of the dislocation was successfully carried out the following day; since that time the patient had frequently dislocated the same shoulder, learning to reduce it himself. His health was otherwise unimpaired until May 15, 1938, when he had an epileptic seizure during his sleep. This was witnessed by his mother, who described tonic and then clonic phases with tongue biting and incontinence but no laterality of convulsive movements. However, the patient noted that there were slight weakness of the right upper extremity for two or three days afterward and a tendency to stumble. Between that date and July 3 there were six such seizures with similar pattern. His past history included a brief period of unconsciousness in his youth after being struck on the head by a stone. A paternal uncle was said to have died during an epileptic seizure. The patient's mother and brother were described as "nervous and high strung."

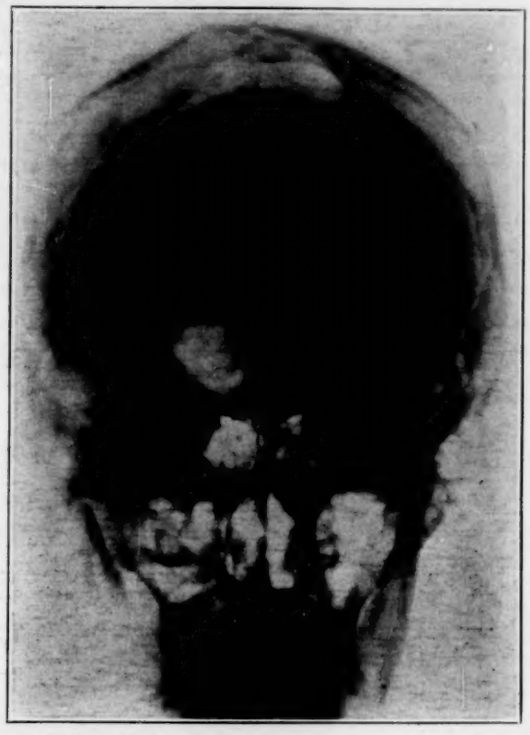

Fig. 2.—Large pocket of air in the left frontal region revealed by pneumo-encephalography.

The patient was tall, thin and well developed. He showed marked dermographia, ready flushing of the skin and chronic otitis media on the left. The blood pressure was 120 systolic, 95 diastolic. The neurologic examination revealed a diminished right arm swing on walking and reversal of the normal hearing formula in the left ear. Hyperventilation and carotid sinus pressure produced no effect. Examination of the blood, urine and spinal fluid revealed no abnormalities. The basal metabolic rate, visual fields and x-ray appearance of the skull were all within normal limits. A pneumo-encephalogram made on October 10 revealed a large pocket of air in the left frontal region just behind the frontal sinus, irregular in outline and measuring about 4 by 4 cm. It did not appear to communicate with the ventricle. The third and lateral ventricles appeared somewhat dilated (figs. 1 and 2).

Electro-encephalographic studies were performed without any knowledge of the history, clinical or pneumo-encephalographic features. The report follows:

Bipolar Study.—Fronto-occipital region: right, normal; left, alpha waves less frequent than normal and broken up by large numbers of beta waves; occasional delta waves.

Unipolar Study.—(*a*) Frontal region: right, normal; left, few alpha waves, many beta waves, fairly frequent delta waves with occasional spike forms. (*b*) Parietal and occipital regions:

11. Dean, G. O., and Dulin, J. W.: Treatment of Varicose Veins, Arch. Surg. **39**: 711-719 (Nov.) 1939.

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right, normal; left, similar to frontal but becoming less abnormal as the occipital zone is approached.

The impression was that there was an epileptogenic focus in the left frontal lobe involving the cortex. The paucity of delta waves was somewhat against an expanding lesion.

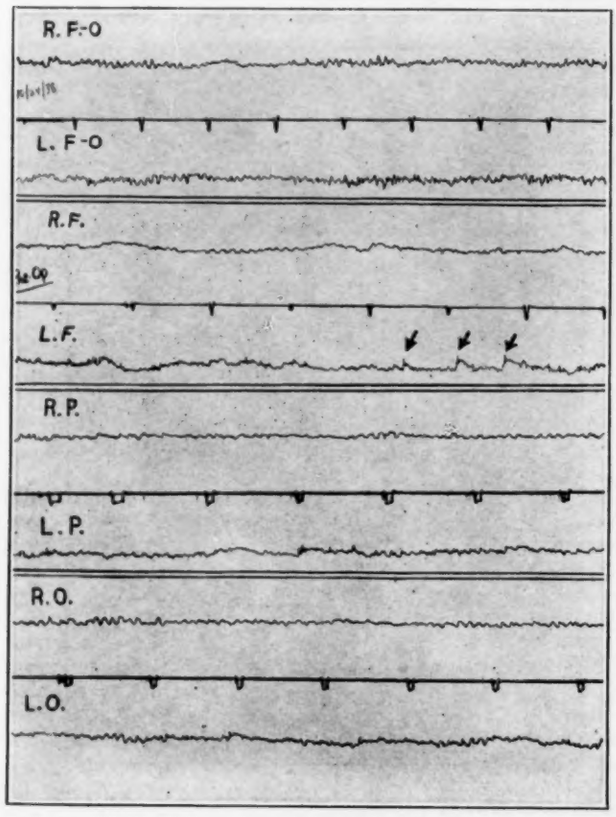


Fig. 3.—Preoperative electro-encephalogram: In figures 3 and 4 *F-O* indicates bipolar fronto-occipital leads; *F*, unipolar frontal leads; *P*, unipolar parietal leads; *O*, unipolar occipital leads. The arrows point to the sporadic spike formations in the left frontal leads (*L. F.*).

The patient had two more epileptic seizures early in November and was then subjected to a left frontal craniotomy with the area under procaine hydrochloride anesthesia. At the extreme left frontal pole a large cyst was encountered the wall of which was made up of a thin layer of cortex less than 1 cm. in thickness. A partial excision of this region was made, after which the patient had a stormy postoperative course characterized by clouding of consciousness and some aphasia. Within two weeks the condition cleared up entirely and he left the hospital with no demonstrable neurologic signs or subjective complaints.

An electro-encephalogram made four weeks after operation (fig. 4) was reported as follows: No abnormal wave productions were noted on either side of the brain in any of the standard leads. There were no spike formations and no delta waves. The alpha wave production, however, was poorer on the left than on the right, especially in the left frontal lead. The records at this time showed no evidence of any epileptogenic focus and provided a striking contrast to the records taken preoperatively. The poor alpha wave production in the left frontal area was explicable on the basis of the removal of a large section of cortical tissue from that area.

To date the patient has had no further seizures.

COMMENT

This case is of interest from several aspects: the paucity of objective neurologic abnormalities on clinical examination must be emphasized. Except for the diminished right arm swing, which many observers were inclined to attribute to joint changes associated with the chronically dislocated shoulder, results of clinical neurologic examination were entirely negative. The accurate correlation between the observations obtained by electro-encephalography and by pneumo-encephalography is a further point of interest in this case. It should be noted that as yet electro-encephalography is not capable of distinguishing different types of focal pathologic conditions, although the impression in this instance, because of the paucity of delta waves, was that we were not dealing with an expanding lesion. However, the method is capable of clearly indicating and localizing the presence of a focal cortical pathologic change, which makes it a valuable adjunct to the neurodiagnostic aramentarium. It is particularly valuable in a case like the present one, in which the clinical data are meager and the question of differentiating between an idiopathic and a focal epileptic disorder arises. It has the advantage over pneumo-encephalography of being simple to perform and entirely harmless, and the great advantage to the patient of being free from any discomfort or risk. We feel that in selected cases and with growing experience in this still young technic it may well become the method of choice over pneumo-encephalography, the latter technic being retained as a method of last resort when the combined clinical and electro-encephalographic observations still leave the diagnosis in doubt.

SUMMARY

Post-traumatic epilepsy came on eight years after skull fracture. There were no localizing signs on examination. The only clue obtainable was a history of slight weakness in the right upper extremity following the seizures. A pneumo-encephalogram revealed a large cystic area in the left frontal region of the brain. Electro-encephalographic studies independently performed pointed to an epileptogenic focus in the same area, which was interpreted as probably not an expanding lesion. Craniotomy revealed a large intracerebral cyst, part of which was excised; subsequently an electro-encephalogram showed disappearance of the epileptogenic focus. No further seizures have occurred to date.

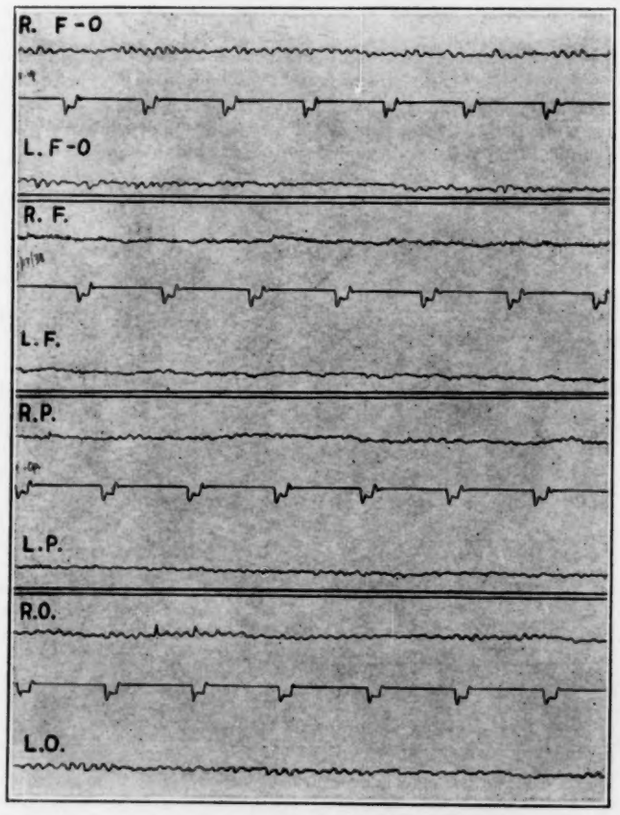


Fig. 4.—Postoperative electro-encephalogram: In the left frontal lead, note the absence of the spike formations and the relatively flat curve as compared with the corresponding preoperative lead.

NOTE.—Since this paper was written the patient has had two major convulsions, but it has not been possible to make further electro-encephalographic studies for technical reasons.

Special Article

THE PHARMACOPEIA AND THE PHYSICIAN

THE DRUG THERAPY OF EPILEPSY

WILLIAM G. LENNOX, M.D.

BOSTON

This is one of the second series of articles written by eminent authorities for the purpose of extending information concerning the official medicines. The twenty-four articles in this series have been planned and developed through the cooperation of the U. S. Pharmacopeial Committee of Revision and THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION.—ED.

Traditionally the attitude toward the treatment of epilepsy is one of defeatism. By definition, epilepsy is a hopeless disease; why, therefore, waste time and attention on it? Because much of the current medical opinion about the nature of epilepsy is out of date, a few paragraphs must be spent in orientation. The intelligent use of drugs in the treatment of epilepsy necessitates an understanding of the underlying cause or causes of this disorder.

WHAT EPILEPSY IS

Briefly, epilepsy is a symptom of a disturbance in the electrochemical activity of the discharging cells of the brain: it is a paroxysmal cerebral dysrhythmia.[1] In epilepsy the dysrhythmia of the brain is analogous to those disordered rhythms of the heart which interfere with cardiac function. The patterns of electrical rhythm seen in a normal person and in epileptic patients during the three principal types of seizures are shown in the accompanying electro-encephalographic tracings.

WHAT CAUSES ABNORMAL RHYTHMS

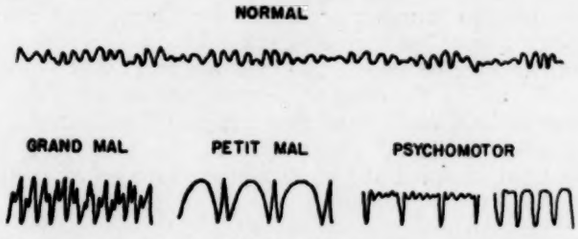
The dysrhythmia of the brain is, I believe, due to a peculiar chemical or physicochemical constitution of neuronal cells which causes various cell clusters to discharge at a rate and with a voltage which is both abnormal and functionally devastating. The details of what must be an inscrutably intricate and minute chemical process in brain cells are of course not known. However, the underlying causes of their abnormal discharge can be separated into two types: There is, first, the constitutional or hereditary makeup or reaction of the discharging nerve cells—a quality fundamental and fixed. Second, there are abnormalities of the body or of the rest of the brain which act on the inner mechanism of the cells and accentuate the tendency to an abnormal discharge—factors precipitating and variable.

To use a homely illustration, a bonfire requires both combustible material and a lighted match. Though probably both constitutional and environmental factors are present in all who have epilepsy, their relative importance varies in different individuals. The acquired abnormalities which activate the inherent predisposition to seizures are multiple and variable.[2] Consequently, the greater portion of therapy must be individual, tailor made for the given patient. It is the main business of the physician to find and if possible to remove the various causes, both fundamental and precipitating, that may be found.

GENERAL TREATMENT

The portion of epilepsy which is due to heredity can in time be corrected by eugenics, since a laboratory method of determining the predisposition to seizures and allied disorders in healthy persons is now available.[3] The bodily disorders that help to produce seizures must each receive its own appropriate therapy. Brain tumors, meningeal scars, endocrine disorders, emotional disturbances, toxic conditions, inadequate physique and poor regimen must be treated individually. Such therapy should be the principal concern of the conscientious physician. The most dramatic relief from seizures that I have seen was obtained by patients who never took medicine for them.

In the United States there are five or six patients for every physician, too large a number to be treated by specialists. The family physician is most strategically placed to treat patients with seizures if he possesses or will acquire the required interest, hope and knowledge. The patient needs protection from physical and mental sequelae of repeated seizures or from psychologic or personality dislocations arising from the hostile attitude of society. Of the many handicaps that may face the epileptic, a defeatist attitude of the doctor to whom they go for advice and encouragement is most inexcusable. The majority of persons with epilepsy can be either relieved of their symptoms or helped to live a useful life in spite of them. These fundamental and individual needs attended to, and not till then, the physician is free to consider medication.



Types of cerebral dysrhythmia found in three types of seizures. The upper line is the tracing of a normal person, the waves occurring at the rate of 8 or 10 a second. In the lower line the fast spiky waves at the left were recorded during a grand mal seizure, the wave and spike pattern in the middle during a petit mal seizure, and the slow waves at the right during a psychic variant (psychomotor) seizure.

THE DRUG THAT WILL CURE

The drug that can be spoken of as a specific for epilepsy (paroxysmal cerebral dysrhythmia), when and if it is found, will stabilize the rate at which the neurons of the brain discharge. In the cerebral dysrhythmias of epilepsy the waves of electrical activity are at times either too fast or too slow. Presumably a drug that effectively slows an abnormally fast rhythm will make a patient whose rhythm is already too slow worse. To complicate matters, most patients display a rhythm which is at one time too fast and at another time too slow. The ideal antiepileptic drug will be one which prevents the initiation of rates that are either abnormally fast or abnormally slow. This sounds utopian, but the electrical discharge of neurons is conditioned by their physicochemical state, and it is already known that various procedures and medicines modify both the elec-

From the Neurological Unit, Boston City Hospital, and the Department of Neurology, Harvard Medical School.

1. Gibbs, F. A.; Gibbs, Erna L., and Lennox, W. G.: Epilepsy: A Paroxysmal Cerebral Dysrhythmia, Brain **60**: 377 (Dec.) 1937.

2. Lennox, W. G.: Epilepsy: Multiple Causes of Seizures in Individual Epileptic Patient, New England J. Med. **209**: 386 (Aug. 24) 1933.

3. Lennox, W. G.; Gibbs, Erna L., and Gibbs, F. A.: The Inheritance of Epilepsy as Revealed by the Electro-Encephalograph, J. A. M. A. **113**: 1002 (Sept. 9) 1939.

trical waves of the brain and the tendency to seizures.[4] Auricular fibrillation has its quinidine, and research should be able to discover new medicines that will control the dysrhythmias of epilepsy better than drugs in use at present. Though this subject is tempting and stimulating, the present discussion of therapeutics must deal with drugs the value of which has been proved empirically.

HISTORY OF DRUG THERAPY

Until eighty years ago discussions of drug therapy in epilepsy included lists both long and bizarre. For example, the prescriptions of Thomas Willis,[5] professor of physic at Oxford and perhaps the most fruitful contributor to the knowledge of epilepsy in the seventeenth century, included such ingredients as powdered human skull, elk's claw, liver of wolf, gall of a boar fried with urine, and stones of swallows. Writing in 1854, Delasiauve discusses fifty-two medicines then in use. At present our attention can be centered on three agents—bromides, barbiturates and hydantoinates.

Potassium bromide, discovered in 1826, was introduced into the British Pharmacopeia in 1835 (for the treatment of splenomegaly) and removed in 1851.[6] Although Sir Charles Locock is credited with first using bromides in epilepsy, he apparently never made a written communication on the subject. While discussing a paper by Sieveking in 1857 [7] he mentioned that, after reading of a German who noted his own impotence when taking bromides, he (Locock) gave the drug to fourteen or fifteen female patients whose seizures were hysterical or related to the menses. All but one were benefited. Six or seven years was required for the use of the drug to become general, but for fifty years it held undisputed first place in the treatment of seizures. Gowers [6] states that in the year 1899 the National Hospital at Queen Square, London, dispensed almost 2 tons of bromide.

Phenobarbital was synthesized in 1903,[8] but its use for epilepsy was first reported by Hauptmann [9] in 1912. He states that favorable results were obtained but does not give the number of cases, and the only data presented are in an unlabeled chart showing a reduction in the monthly number of seizures of one patient. Other German articles followed quickly, but the coming of the war prevented distribution of the drug and the first report from America was by Grinker [10] in 1920. In this country phenobarbital was adopted as the official name, though it is still sold under the name luminal (or gardenal) in Europe and under the proprietary name Luminal in the United States.

In 1936 Putnam, refusing to believe that knowledge had died with Locock and Hauptmann, began the systematic evaluation of scores of drugs as anticonvulsants for animals. Putnam and Merritt [11] in 1937 reported that sodium diphenyl hydantoinate (dilantin sodium) was superior to either bromides or phenobarbital in preventing convulsions electrically induced in cats, a result which they later confirmed on patients.

4. Gibbs, F. A.; Gibbs, Erna L., and Lennox, W. G.: Cerebral Dysrhythmias of Epilepsy: Measures for Their Control, Arch. Neurol. & Psychiat. **39:** 298 (Feb.) 1938.
5. Willis, Thomas: Practice of Physick, London, 1684.
6. Gowers, William R.: Epilepsy and Other Chronic Convulsive Diseases, London, J. & A. Churchill, 1901.
7. Sieveking, E.: Analysis of Fifty-Two Cases of Epilepsy Observed by the Author, Lancet **1:** 527 (May) 1857.
8. Fischer, E., and von Mering, J.: Ueber eine neue Klasse von Schlafmittelm, Therap. d. Gegenw. **5:** 97, 1903.
9. Hauptmann, A.: Luminal bei Epilepsie, München. med. Wchnschr. **59:** 1907, 1912.
10. Grinker, Julius: Experiences with Luminal in Epilepsy, J. A. M. A. **75:** 588 (Aug. 28) 1920.
11. Putnam, T. J., and Merritt, H. H.: Experimental Determination of Anticonvulsant Properties of Some Phenyl Derivatives, Science **85:** 525 (May 28) 1937.

GENERAL PRINCIPLES

1. The physician is to treat the patient, not just one of the patient's symptoms. If he stops convulsions but in doing so makes the patient stupid and an outcast, he fails.

2. The physician is to prevent the whole seizure and not just the involuntary muscular movement—the convulsion. Disturbances of consciousness, of the sympathetic and parasympathetic nervous systems, of sensation and of the psyche are part and parcel of a convulsive seizure, or they may make up a seizure which is nonconvulsive. More than two thirds of all seizures consist simply of loss of consciousness with insignificant involuntary muscular movements (petit mal) or else of psychic disorders (epileptic equivalents). The bromides and phenobarbital are of uncertain value for petit mal, or in large doses they may actually make psychic seizures worse. Overdosage with the bromides or phenobarbital may produce symptoms which resemble the mental or behavior characteristics of psychic epilepsy. Overdosage also slows the electrical waves of the brain, which in psychic epilepsy already are abnormally slow.[12] The unwary physician may be fighting fire with gasoline if he tries to stop all symptoms by means of sedative drugs.

3. The influence of drugs varies not only for different types of seizures but also for the same type of seizure in different patients. Because Sally Jones's convulsions are helped by bromide or phenobarbital is no proof that Sam Brown will benefit. The use of an antiepileptic drug is for each patient a fresh experiment. The object of the experiment is to find whether the drug helps him. No answer is possible unless there has been a control period when no drug or a smaller amount of the drug was taken. Seizures are notorious for the irregularity of their appearance. Natural remissions, which may come without apparent reason and last for years, are an encouragement to patients but may fill the coffers of "patent medicine" concerns and make ridiculous many of the reports of reputable but uncritical writers. Hence the need for conservative appraisal of the results of medication. Paré's modest declaration "I dress the wound, God heals it" is as good for seizures as for surgery.

4. Medication should be continued only if thorough trial demonstrates its effectiveness in controlling or ameliorating seizures in this particular case. The matter of seizures aside, other effects of sedative drugs are undesirable. Physicians should have the hardihood in the face of general custom not to continue the use of a sedative drug if the patient is not benefited by it. Of course the trial, to be conclusive, must be of sufficient length, and even as little as a 10 or 20 per cent reduction in the number of seizures is worth while. Furthermore, though attacks continue unabated, trial may demonstrate that without medication they would be yet more frequent or severe.

ADMINISTRATION

Because seizures are usually uncertain in the time of their occurrence, the concentration of the drug in the body should be maintained at a constant level; hence it must be taken daily. Only those occasional patients whose seizures occur periodically (as during the menses) or at a fixed time in the twenty-four hours can concentrate medication in the period immediately

12. Lennox, W. G.; Gibbs, F. A., and Gibbs, Erna L.: Effect on Electro-Encephalogram of Drugs and Conditions Which Influence Seizures, Arch. Neurol. & Psychiat. **36:** 1236 (Dec.) 1936.

preceding the expected seizure. In the future, prediction of convulsions may be possible by means of daily electro-encephalographic readings.[1] Patients who have only nocturnal seizures are generally advised to take all their medicine at bedtime. However, the possibility of driving seizures into the undesirable daytime period must be considered.

Maintenance of a constant level of bromide and phenobarbital in the tissues is possible because these drugs disappear from the body slowly. The bromides, though present in all body secretions, are eliminated mainly in the urine. After a single dose about 10 per cent will disappear in the first twenty-four hours, but traces may be found in the urine for months. In contrast, about four fifths of the phenobarbital is said to be oxidized in the tissues and only about one fifth is eliminated in the urine. Dilantin sodium apparently disappears from the tissues fairly promptly. The amount of drug ingested should, after an interval, balance the amount destroyed or eliminated. Frequent doses throughout the day are not desirable because they bring the patient's condition to his attention. Once a day is sufficient for phenobarbital but, because of the possible gastric irritation from large single doses, the bromides and dilantin sodium are best given three times a day.

Anticonvulsant drugs often seem to act as a dam which prevents seizures for a time but allows them to come out with unusual volume when the drug is abruptly discontinued. In other words, these drugs may act by raising the seizure threshold rather than through any specific correction of the abnormal seizure mechanism. They may prevent seizures but not influence dysrhythmias. Medication should not be discontinued abruptly. In the case of the bromides, the slow excretion cushions the withdrawal. The absence of an increase of seizures after withdrawal probably means that the drug was without effect. The beneficial effect of anticonvulsant drugs often "wears off." In this event, after a rest the patient may be able to resume medication with hope of a repetition of the initial benefit. Pregnancy need not interrupt medication. The bromides are secreted in the milk of the mother.

The aim of medication is to give an amount which will control symptoms without interfering with the normal activity of the individual. It is better for patients to have occasional attacks than to be free of attacks and yet so drugged that they are but half alive. The optimum amount for each patient must be determined by experimentation. Dosage is more variable for phenobarbital and dilantin sodium than for bromides, possibly because of individual differences in susceptibility or in the rate of oxidation. For accurate results, the physician should keep a calendar of his patient's seizures (the one devised by Wheeler[13] is very good). Starting with a moderate dose, if seizures continue, the physician should step up the amount of the drug at intervals until an increase does not result in a decrease of seizures, or until symptoms of intoxication appear or a certain maximum is reached.

How long should medication be continued after seizures have ceased? Those who advise continuance for life give more credit to the drug than to natural healing forces in the body. The symptoms of epilepsy cannot be spoken of as cured but only arrested. After one or two years of freedom the dose may be reduced and several months later omitted. The physician must be guarded in his prognosis, because seizures may return after many years of freedom. Furthermore, the patient's clinical record may be good but his electrical record bad. His bodily seizures may be separated by years but his brain dysrhythmias by minutes. Just as a syphilitic patient now receives active treatment if he is symptom free but has a positive Wassermann reaction, the epileptic patient may receive treatment based on the type and degree of abnormality of his electro-encephalogram.

A stumbling block in the minds of some patients, especially in the case of those using barbital and its derivatives, is the possibility of "getting the drug habit." None of the three drugs under discussion are habit forming in the sense in which morphine is. The dependence is more psychologic than physiologic, at least in the usual epileptic person, who is not psychoneurotic. He may fear to give up his drug, but in my experience he has no withdrawal symptoms when he does so. Alert patients dislike sedatives because in effective doses they are likely to produce morning "hangovers," but unlike the other two drugs dilantin sodium does not have a sedative effect.

PHARMACOLOGY

In the intelligent use of these drugs the physician should be familiar not only with the effect on seizures but also with other effects. He would like most to know the essential mechanism by which the drug retards seizures and why it is effective in some cases or in some types of seizures and not effective in others.

Just how the chemical exerts its physiochemical effect on the brain is not known—whether it prevents the abnormal electrical discharge (or its spread) by altering the permeability of the cell membrane, by affecting the electrolyte balance or by the oxidative processes of the cells. After injection of a solution of a bromide into an animal, the greatest concentration of the bromide is found in the cortical and that of phenobarbital in the subcortical areas of the brain; hence the assumption that the action of the two drugs is on these respective areas. But the apparent concentration of bromide in the cortex may simply reflect the high water content of the cortex. The relatively low concentration of bromide in the brain as compared with that in the blood and other tissues is due to the low chloride content of the brain.[14]

Though ignorant of the chemical mechanism by which sedatives act, workers are now able to record the effect of drugs on the essential electrical activity of the brain. Sodium or potassium bromide and phenobarbital seem to inhibit the development of the abnormal patterns characteristic of petit mal, or else they break up the abnormal rhythm before it has gone long enough to constitute a clinical seizure.[12] The effect on other types of dysrhythmia needs to be worked out.

The principal pharmacologic features of the three drugs are as follows:

Sodium or Potassium Bromide.—Bromine may be combined with many metals—sodium, potassium, calcium, ammonium, lithium, strontium or zinc—to form the respective bromides. These salts are white, odorless, cubital crystals or a granular powder. They are easily soluble. The bromides are absorbed rapidly

13. Wheeler, Theodora: Graphic Charting Method for Use in Recording Seizures of Patients with Epilepsy, Arch. Neurol. & Psychiat. **35**: 776 (April) 1936.

14. Boshes, Benjamin: Study of Action of Bromides in Clinical and Experimental Epilepsy, J. Nerv. & Ment. Dis. **83**: 390 (April) 1936.

when taken by mouth, the effect on seizures being noted within fifteen minutes. A bromide behaves like a chloride, the two electrolytes maintaining a reciprocal relationship. For a steady concentration of bromide in the body the chloride intake should be fairly constant. If the chloride intake is reduced the patient can economize on his dose of bromide, for more of it will be retained. Conversely, an increased sodium chloride intake may increase the elimination of bromides and bring on seizures. If the patient is suffering from bromide intoxication the treatment is infusion of from 100 to 500 cc. of isotonic sodium chloride solution and ingestion of from 12 to 16 Gm. (192 to 256 grains) of sodium chloride in water daily. The process of debromidization may cause exacerbation of symptoms, as the bromide is "pushed" from the tissues to the blood stream and will require two or three weeks for its completion.

In concentrated doses bromides, like any salt, cause irritation of the stomach, dehydration and thirst. With larger doses the pulse, respiratory rate, reflexes and sex impulses are decreased. Four Gm. (60 grains) given in a single dose leads to depression of reflexes and mental calmness amounting to sluggishness and sleep. Excessive administration leads to poor memory, apathy, disturbed speech, ataxia, impotence, anorexia, anemia and emaciation. If persisted in there may follow restlessness, disorientation, paranoid trends, hallucinations and stupor. The physician may confuse this state with the psychic seizures of epilepsy, which have already been emphasized, and by thoughtless medication he may increase symptoms which he is trying to allay.

Effect on Mentality and Skin: The two chief objections to the long continued use of bromides in epilepsy have been the reputed effect on the mentality and that on the skin. The saddest and most baffling aspect of epilepsy is the tendency toward mental retardation. Any treatment which to the slightest extent accelerates the process is to be used circumspectly. Mental failure in epilepsy has no simple explanation but is related to heredity,[15] stigmas of degeneration,[16] the type, frequency and duration of seizures and the extent of brain lesions, as well as to the medical and psychologic treatment given. Many patients maintain a normal intellect in spite of a flood of seizures and sedatives. Yet clinicians have always viewed the influence of bromides on mentality distrustfully. Recently Paskind[17] has summoned a swarm of witnesses against bromide from Eccheverria to Ebaugh and believes that he refutes them by showing that Dr. Hugh Patrick gave fifty-four private patients from 24 to 72 grains (1.6 to 4.6 Gm.) of bromide daily for a year or more and only 5.5 per cent gave evidence of mental deterioration. Because 35 per cent of noninstitutionalized patients are mentally abnormal, it must be concluded either that bromide as used by Patrick is a protection against deterioration or that those who remained in his orbit for more than a year were a highly selected group. I believe that persons who are mentally stable (whether epileptic or normal) can take moderate amounts of bromide with impunity, whereas those epileptic persons who are mentally unstable or have psychic variant seizures would better be given other medication.

15. Lennox, W. G.: The Epilepsies, chapter XII in Tice's Practice of Medicine, Hagerstown, Md., W. F. Prior Company, Inc. **10**: 225, 1938.
16. Paskind, H. A., and Brown, Meyer: Constitutional Differences Between Deteriorated and Nondeteriorated Patients with Epilepsy; Stigmas of Degeneracy, Arch. Neurol. & Psychiat. **36**: 1037 (Nov.) 1936.
17. Paskind, H. A.: Absence of Deteriorating Effects of Bromides in Epilepsy, J. A. M. A. **103**: 100 (July 14) 1934.

The second objection to bromide, the tendency to acneform eruptions, may not seem important but actually is, because a patient whose face is disfigured with marks of bromide eruption has his difficulties of self consciousness, of inferiority and of social adjustment greatly enhanced. Scrupulous cleanliness and the use of arsenic preparations may somewhat mitigate eruptions.

Preparations: There is no virtue in combining the various salts. The choice lies between sodium and potassium. Crystallized sodium bromide contains 57 per cent bromine and the potassium compound 67 per cent. The former is less bitter. As the sedative effect is due to the bromide ion, the salt used is presumed to be a matter of indifference. However, the ratio of sodium to potassium in nervous tissues is highly influential in the discharge of the nerve impulses. If 4 Gm. (64 grains) of sodium or potassium bromide is taken daily, the sodium would constitute about one fourth the normal average daily intake of sodium, and the potassium about one half the normal intake of potasium. These amounts, since readily excreted, should not influence the existing equilibrium of electrolytes in the blood.

The physician who prescribes bromide (or who must diagnose bromide intoxication from other intoxications) should measure the bromide content of the blood serum. Wuth's[18] method can be used for less exact and Toxopeu's, as modified by Dailey,[19] for more exact quantitative analyses. Unfortunately, bromide relationships are highly erratic. The amount in the blood bears no fixed relationship to the amount ingested, to the amount which enters the brain or to the clinical effect either on seizures or on general symptoms.[14] As low a concentration as 100 mg. per hundred cubic centimeters in the blood will be effective in controlling seizures in some patients, and as high as 300 mg. will be ineffective in others. Symptoms of intoxication are usually present above 150 mg.[20] and a concentration of 300 mg. is dangerous. However, few fatalities from bromide intoxication have been reported.

Bromides are most easily and cheaply prescribed as sodium or potassium bromide tablets, 10 grains (0.65 Gm.) each, or a prescription may be written for a watery solution, to disguise the taste, as in the prescription given.

Watery Solution of Sodium Bromide to Disguise Taste

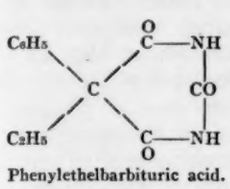
		Gm. or Cc.
℞	Sodium bromide	45
	Water	45
	Syrup of glycyrriza ..... to make	180

Label: One teaspoonful in glass of water or milk three times a day after meals.

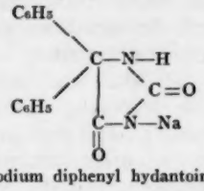
This gives 15 grains (1 Gm.) three times a day, an average dose. If a cutaneous eruption or undue drowsiness appears, the amount must be reduced. If such symptoms remain absent but seizures persist, the dose can be increased to as high as 30 grains (2 Gm.) three times a day. Children require less in an amount roughly proportional to their weight.

18. Wuth, Otto: Rational Bromide Treatment: New Methods for Its Control, J. A. M. A. **88**: 2013 (June 25) 1927.
19. Fremont-Smith, Frank; Dailey, Mary E., and Sloan, Dorothy H.: Distribution of Bromide in Blood Serum and Cerebrospinal Fluid, Arch. Neurol. & Psychiat. **33**: 764 (April) 1935.
20. Cheavens, T. H.; Carter, C. F., and Bagwell, J. S.: Mental Disturbances Due to Bromide Intoxication: Clinical Study of Twenty-Three Cases, Texas State J. Med. **33**: 375 (Sept.) 1937.

Phenobarbital.—Phenobarbital is phenylethelbarbituric acid; the chemical formula is $C_{12}H_{12}O_3N_2$. The structural formulas of phenobarbital and of dilantin sodium are placed together for comparison.



Phenylethelbarbituric acid.



Sodium diphenyl hydantoinate.

Phenobarbital is a white crystalline powder, odorless and stable in the air; 1 Gm. is soluble in about 1 liter of water. The drug is readily absorbed from the intestinal tract. The small fraction not oxidized is excreted rather slowly. A single large dose may protect against seizures as long as four days. In toxic doses phenobarbital decreases temperature, oxygen consumption and respiration and relaxes smooth muscle. Rarely a patient will present a cutaneous reaction, a fine maculopapular generalized rash which resembles that of scarlet fever (without the circumoral pallor) and disappears in a few days after medication is stopped. The medicine may then be resumed in smaller doses and probably increased without further cutaneous disorders. The rash seems to be an idiosyncrasy. With large doses appear nystagmus, loss of the abdominal reflex, ataxia, dizziness and finally mental confusion, psychosis and paranoid symptoms. These psychic symptoms appear more easily in epileptic patients who are subject to psychomotor seizures.

The question of whether phenobarbital contributes to mental deterioration is not raised as often as in the case of the bromides. While most patients take 1 or 2 grains (0.065 or 0.13 Gm.) a day for years without apparent harm, a few will complain of morning sleepiness and lethargy. On several occasions I have inadvertently precipitated psychic outbursts in patients by the intravenous injection of from 10 to 15 grains of soluble phenobarbital. In case doubt exists as to whether the drug is depressing the mentality, temporary sharp reduction or elimination of phenobarbital is a wise course.

Phenobarbital is now often used in attempted suicide.[21] In a number of states it may be dispensed only with a prescription. The average fatal dose is from 3 to 4 Gm. (45 to 60 grains).[22] The treatment of phenobarbital poisoning, after stomach washing, is the use of heroic doses of strychnine intravenously, from 5 to 20 mg. (one-twelfth to one-third grain) for the initial dose, repeated at half hour intervals with decreasing amounts as the patient's condition improves.[23] Epinephrine hydrochloride and picrotoxin in relatively large amounts are also used. When respiration is dangerously depressed a Drinker respirator may be life saving.

Dosage: Of phenobarbital from 1½ to 2 grains (0.1 to 0.13 Gm.) a day is the average adult dose. Depending on the circumstances and the results (and if the patient is closely observed) this may be increased to 6 (0.4 Gm.) or even 9 grains (0.6 Gm.) a day. The larger amounts should not be used unless the results, including the effect on seizures, are definitely better than with the average dose. If seizures are not decreased, the question of whether medication is of any benefit should be reopened. The frequency of dosage and other points have been discussed under general principles. The elixir of phenobarbital contains 0.016 Gm. (one fourth grain) of phenobarbital in 4 cc. of solvent.

Because of the poor solubility of phenobarbital, soluble phenobarbital ($C_{12}H_{11}O_3N_2Na$) is used for intravenous or subcutaneous injections. It contains 10 per cent less phenobarbital than the phenobarbital itself. The powder is put up in sterile ampules. It decomposes on boiling, so that the amount in the ampule (2 or 5 grains [0.13 or 0.32 Gm.]) should be dissolved in warm sterile distilled water drawn into a 10 cc. syringe before injection, which should be made very slowly. Tablets of soluble phenobarbital are sometimes prescribed for oral use on the assumption that they are absorbed more quickly. Liquid preparations of the sodium salt should not be kept more than three weeks, as absorbed carbon dioxide precipitates the acid form.

If it could be shown that bromides and phenobarbital act in a different manner or on different areas of the brain, a combination of the two drugs might be more effective than either alone. Some clinicians believe that their experience justifies a double barreled attack. Grinker[24] for the most resistant cases used from 15 to 20 grains (1 to 1.3 Gm.) of bromide and 1½ to 2½ grains (0.1 to 0.16 Gm.) of phenobarbital three times a day, a maximum of 60 grains (4 Gm.) of bromide and 7½ grains (0.5 Gm.) of phenobarbital daily.

The barbiturate family is a large one.

Dilantin Sodium.—Putnam and Merritt,[11] working on cats at the Neurological Unit of the Boston City Hospital, first demonstrated the value of dilantin sodium as an anticonvulsant. They then proved its usefulness for patients.[25] This drug is analogous to the barbiturates but is a derivative of glycolyl urea instead of malonyl urea. The structural formula has been shown beside that of phenobarbital. It is an odorless, white powder with a bitter taste. It is soluble in an aqueous solution at p_H 11.7, which makes intravenous injection impracticable. Dilantin sodium is superior to phenobarbital in two important respects: it is a more effective anticonvulsant and it has a relatively weak hypnotic effect. Merritt and Putnam[25] have reported results on 267 patients treated for from two months to two years. They counted those patients who, considering their previous histories, were definitely better with the new treatment than with their previous (usually phenobarbital) treatment.

The proportion of patients showing freedom from or substantial decrease in the number of the different types of seizures is given in table 1. Many patients had more than one type.

The most striking improvement was in seizures of the psychomotor (psychic equivalent) type, a form which is little influenced by the bromides or phenobarbital. The least favorable results were encountered in petit mal attacks, in which there is transient loss of consciousness without muscle movement. In cases of

21. Hambourger, W. E.: A Study of the Promiscuous Use of the Barbiturates: Their Use in Suicides, J. A. M. A. **112**: 1340 (April 8) 1939.

22. Bastedo, W. A.: Materia Medica, Philadelphia, W. B. Saunders Company, 1937.

23. Weiss, Soma: Therapeutic Indications and Dangers of Intravenous Administration of Sodium-Phenyl-Ethyl-Barbiturate (Sodium Luminal) and Other Barbituric Acid Derivatives, Am. J. M. Sc. **178**: 390 (Sept.) 1929.

24. Grinker, R. R.: Proper Use of Phenobarbital in Treatment of Epilepsies, J. A. M. A. **93**: 1218 (Oct. 19) 1929.

25. Merritt, H. H., and Putnam, T. J.: Sodium Diphenyl Hydantoinate in Treatment of Convulsive Disorders, J. A. M. A. **111**: 1068 (Sept. 17) 1938; Arch. Neurol. & Psychiat. **42**: 1053 (Dec.) 1939.

pure petit mal, improvement was noted in only 47 per cent. In cases in which both petit and grand mal occurred, 61 per cent showed improvement of their petit mal. Petit mal attacks are often more frequent under dilantin sodium medication. Statements about petit mal by various authors cannot be reconciled, because some physicians classify as petit mal attacks which are really short psychic equivalent seizures.

In the little more than a year since the paper by Merritt and Putnam appeared, results in series of cases have been reported by Kimball,[26] Phillips,[27] Williams,[28] Blair, Bailey and McGregor,[29] Steel and Smith,[30] Hodgson and Reese,[31] McCarton and Carson,[32] Pratt,[33] Frost,[34] Weaver, Harrell and Arnold[35] and Robinson and Osgood.[36] The Council on Pharmacy and Chemistry of the American Medical Association[37] listed the results on 542 patients treated by thirteen clinicians. Among all these authors there is general agreement that if dosage is adequate the majority of patients are very definitely improved as far as their attacks are concerned. Some are miraculously improved, many are not improved and a few are worse. In addition, many with clouded mentality become clearer either because of the decrease in seizures or because the underlying dysrhythmia is improved.

TABLE 1.—*Proportion Showing Freedom from or Decrease in Number of Seizures*

Type of Seizure	Number of Patients	Per Cent of Patients Whose Seizures Were		
		Absent	Greatly Reduced	Total Helped
Psychic variants	39	62	23	85
Grand mal	227	60	14	74
Petit mal	104	39	20	59

The question whether dilantin sodium merely prevents the appearance of seizures or corrects the underlying dysrhythmia is of course exceedingly important. My associates and I[12] observed that the intravenous injection of the bromide or phenobarbital might temporarily prevent or abort the dysrhythmia of petit mal. Hyland and his associates[38] reported one case in which dysrhythmia was much improved by dilantin sodium. Merritt and I[39] find that in most of our cases in which examinations are made the electrical improvement does not parallel the clinical improvement. Electrical records of patients who are rendered symptom free may continue as bad as ever. On the other hand, the record of a patient who has had abrupt and complete relief of attacks, especially of the psychomotor variety, may become essentially normal. The latter results bring forward the question whether drug treatment should be used for persons with dysrhythmia but without symptoms, with the hope of preventing the development of seizures. This question cannot as yet be answered. Also the lapse of time is insufficient to permit judgment as to the permanence of clinical improvements noted. So far there have been few relapses, these instances presumably comprising patients whose seizures but not their dysrhythmia had been improved.

Physicians who have used dilantin sodium are agreed that its successful administration requires careful supervision and manipulation of dosage. The guiding principle of treatment is to begin, in the adult, with 0.1 Gm. (1½ grains) three times a day and, if seizures continue, gradually to increase the dose until seizures are controlled or unpleasant side actions appear. Under this plan a large proportion of patients will manifest toxic symptoms. None of the symptoms are serious if noted promptly and proper action is taken. The most prominent are as follows:

Symptoms: Gastric symptoms are presumably due to the alkalinity of the drug. The capsules, which are usually taken with half a glass of water before meals, may be taken after meals. Nausea may be relieved by the addition of one-sixtieth grain (1 mg.) of belladonna.

The most prominent symptoms of the central nervous system are dizziness, instability of posture, ataxia, tremor, nystagmus and blurred or double vision. Clonic jerkings, which may appear, are probably petit mal.

Scarlet fever-like rash, dermatitis or itching of the skin may occur. Occasionally fever accompanies the rash.

Rarely a feeling of weariness and apathy is complained of. This may be relieved by the use of amphetamine sulfate, from 5 to 10 mg. taken in the first half of the day.[40] Even more rare is a complaint of hirsutism, especially in adolescent girls, or swelling of the face. Hyperplasia of the gums was reported in 57 per cent of Kimball's cases[26] but in only 3 per cent of the Boston City Hospital series. Kimball's contention that the scurvy-like appearance of the gums was due to deficiency of ascorbic acid has been disproved by Gruhzit.[41]

Although many patients are mentally brighter while taking dilantin sodium, several instances have been reported in which delusions or hallucinations, excessive activity or other psychotic manifestations occurred. After medication had been stopped and again started, the psychotic symptoms might or might not reappear.

The appearance of any of these symptoms may require reduction, temporary or permanent, in the amount of the drug ingested.

Dosage: The beginning dose of dilantin sodium for adults is 0.1 Gm. (1½ grains) taken three times a day before meals. The use of other anticonvulsant drugs

26. Kimball, O. P.: Treatment of Epilepsy with Sodium Diphenyl Hydantoinate, J. A. M. A. **112**: 1244 (April 1) 1939.
27. Phillips, D. P.: Epilepsy as Prison Problem: Its Treatment with Sodium Diphenyl Hydantoinate, J. Michigan M. Soc. **38**: 317 (April) 1939.
28. Williams, Denis: Treatment of Epilepsy with Sodium Diphenyl Hydantoinate, Lancet **2**: 678 (Sept. 23) 1939.
29. Blair, Donald; Bailey, K. C., and McGregor, J. S.: Treatment of Epilepsy with Epanutin, Lancet **2**: 363 (Aug. 12) 1939.
30. Steel, J. P., and Smith, Seymour: Epanutin in Epilepsy, Lancet **2**: 367 (Aug. 12) 1939.
31. Hodgson, E. R., and Reese, H. H.: Clinical Experience with Dilantin in Epilepsies, Wisconsin M. J. **1**: 968 (Nov.) 1939.
32. McCarton, W., and Carson, J.: Use of Sodium Diphenyl Hydantoinate, J. Ment. Sc. **85**: 965 (Sept.) 1939.
33. Pratt, C. H.: Sodium Diphenyl Hydantoinate and Its Combination with Phenobarbital in the Treatment of Epilepsy, J. Ment. Sc. **85**: 986 (Sept.) 1939.
34. Frost, I.: Sodium Diphenyl Hydantoinate in Treatment of Epilepsy: Preliminary Observations in Severer Cases, J. Ment. Sc. **85**: 976 (Sept.) 1939.
35. Weaver, O. M.; Harrell, D. L., and Arnold, G. B.: Sodium 5.5. Diphenyl Hydantoinate in Fifteen Selected Cases of Epilepsy at the Virginia State Colony for Epileptics and Feebleminded, Virginia M. Monthly **66**: 522 (Sept.) 1939.
36. Robinson, C. J., and Osgood, Rudolf: Comparative Effects of Phenobarbital and Dilantin Sodium in the Treatment of Epilepsy, this issue, p. 1334.
37. Dilantin Sodium, Reports of the Council, J. A. M. A. **113**: 1734 (Nov. 4) 1939.
38. Hyland, H. H.; Goodwin, J. E., and Hall, G. E.: Clinical Applications of Electro-Encephalography, Canad. M. A. J. **41**: 239 (Sept.) 1939.
39. Unpublished data.
40. Cohen, Benjamin, and Myerson, Abraham: Effective Use of Phenobarbital and Benzedrine Sulfate (Amphetamine Sulfate) in Treatment of Epilepsy, Am. J. Psychiat. **95**: 371 (Sept.) 1938.
41. Gruhzit, O. M.: Sodium Diphenyl Hydantoinate (Dilantin): Pharmacologic and Histopathologic Studies, Proceedings of the Twenty-Sixth Annual Meeting of the American Society for Experimental Pathology, Toronto, April 26-29, 1939, p. 13.

should be continued in decreasing amounts for a week after dilantin sodium is started. The amount of dilantin sodium may be increased to a maximum of 0.6 Gm. a day (0.4 Gm. for children above 6 years of age). Children under 4 years of age may start with 0.03 Gm. (one-half grain) twice a day, increased if necessary to three or four times a day. For children who cannot take the capsule, the powder may be mixed with cream to disguise the bitter taste. It is dispensed in 0.03 Gm. (one-half grain) as well as in 0.1 Gm. (1½ grain) capsules. Therefore small differences in dosage may be provided for, which may bridge the difference between a condition of seizures or no seizures. If complete arrest of attacks is not secured with a full dosage of dilantin sodium, the addition of moderate amounts of phenobarbital (from 1 to 2 grains a day) is often beneficial. The optimum dose or combination of doses can be arrived at only by trial, and the prescription of a capsule which contains both dilantin sodium and phenobarbital in a fixed ratio is to be deprecated.

The fact that the successful prescription of dilantin sodium calls for the careful and personal supervision of a physician should prevent its exploitation by the mail order type of medical practice.

Status epilepticus is the dreaded condition in which convulsions come one after the other without consciousness being regained. In this emergency the intravenous injection of soluble phenobarbital is the physician's main reliance. The amount may be from 3 to 5 grains, repeated if necessary after six hours. The tendency is to overdose. Patients are often so thoroughly drugged that vital processes and consciousness are reestablished only with difficulty. In the maintenance of strength dissipated in violent convulsions, infusions of physiologic solution of sodium chloride or of dextrose solutions are of prime importance. If the patient's condition becomes such that complete exhaustion is feared, control of convulsions by the use of a volatile narcotic such as ether or chloroform is probably preferable to narcotization with phenobarbital. A cleansing enema followed by 4 drachms (15 cc.) each of paraldehyde and of olive oil left in the rectum is a valuable routine measure.

There may also be status epilepticus composed not of convulsions but of petit mal seizures. Patients will be in a condition of stupor or daze, able to speak or answer simple questions but incapable of mental work. Such periods may not be distinguishable from amnesic episodes of psychic epilepsy except by electro-encephalography. Administration of from 50 to 75 Gm. of dextrose or having the patient breathe a mixture of 10 per cent carbon dioxide in 90 per cent oxygen may break up the attack. Drugs seem to be useless.

COMPARATIVE VALUES

In the past decades, drugs by the ton have gone down the gullets of persons with epilepsy, but large, carefully controlled statistics on the comparative effect of bromides and of phenobarbital on the same extramural patients and on different types of seizures are lacking. The nearest approach is perhaps the tabulation of results of a large group of noninstitutionalized patients.[42] Of 766 patients who had taken phenobarbital, 65 per cent reported improvement; of 289 taking bromides, 53 per cent, and of 124 taking "patent medicines," 40 per cent were apparently improved. The proportion reporting improvement in mentality while taking these three types of medicines was, respectively, 30 per cent, 26 per cent and 13 per cent.

If the patient has grand mal or psychomotor seizures and his physician is informed and conscientious, I believe that dilantin sodium is the drug of choice. If adequate initial medical supervision is not available, if attacks are predominantly and unmistakably petit mal (and if dilantin sodium fails) then phenobarbital, or as a third choice bromides, must be resorted to.

COMPARATIVE COSTS

For patients who must use a drug for an indefinite number of years and whose earning capacity is seriously impaired, the cost of treatment is an important consideration. The poor patient who must buy on a hand to mouth basis pays per tablet ten times as much for a few tablets as he would pay for 1,000. A given amount of phenobarbital costs five times more in quarter grain than in 1½ grain tablets. As indicated in table 2, the drug therapy of epilepsy need not be expensive—less than $3 a year.

Phenobarbital is cheaper than bromides, and tablets are much cheaper than solutions. Striking is the threefold premium paid yearly for the trade name Luminal. I do not know of a medical report which would indicate that phenobarbital sold under the name of Luminal is more effective in controlling seizures than phenobarbital sold by that name.

TABLE 2.—*Yearly Cost of Drugs Used for Epilepsy*

Preparation	Quantity Bought and Price	Daily Dose, Grains	Cost per Year
Phenobarbital, 1½ grain tablets	100 @ $0.75	1½	$2.75
Sodium bromide, 10 grain tablets	1,000 @ 2.90	45	4.75
Luminal (phenobarbital, Winthrop), 1½ grain tablets	50 @ 1.25	1½	9.10
Sodium bromide solution	6 oz. @ 0.80	45	18.25
Dilantin sodium, 0.1 Gm. capsules	100 @ 2.00*	0.3	21.90
Phenobarbital elixir	16 oz. @ 1.50	1½	26.30
An "epilepsy cure" †	4 wks. supply	Unknown	50.00

* The retail price in Boston drugstores is from $1.75 to $2.50.
† Including cathartic and other unimportant ingredients.

PROPRIETARY DRUGS

Phenobarbital (plus other unimportant drugs) sold by a mail order drug concern costs eighteen times as much as undisguised phenobarbital. The poor person who buys treatment by mail because he "can't afford a doctor" could, with the $50 extra which he pays yearly for the medicine, purchase excellent medical advice (provided of course he knew where to find it).

More than any other group of patients, those with epilepsy are subject to a barrage of form letters from proprietary drug companies which promise to cure the disease or refund the money. Thirty-eight of these so-called epilepsy cures have been analyzed, and the results are published in a brochure by the American Medical Association.[43] The principal drug is bromide or phenobarbital, usually the latter. In recent years the number of advertised "cures" has decreased but the skilfulness of advertising has increased.

The physician who merely asks the routine questions and with a hopeless shake of his head writes a prescription must not be surprised if his epileptic patient goes to an osteopath or responds to the invitation brought by the mailman. One remedy for the medicine-by-mail evil lies in telling the public what epilepsy is

42. Personal unpublished data.

43. Epilepsy Cures and Treatments, Chicago, American Medical Association.

and what physicians can do for patients afflicted with it. Toward this end the group of physicians called the American League Against Epilepsy has organized a Laymen's League Against Epilepsy. Members pay dues of either $1 or $5 a year for the benefit of research and receive in return a series of bulletins which give the background facts about epilepsy that patients and the public should know.

THE CHANCE OF SUCCESS

What rewards may doctor and patient expect from faithfully followed drug therapy? Because no treatment is as yet specific (though the sedatives which slow electrical waves approach this for grand mal), treatment of each patient is symptomatic and expectant and therefore individual. Discouraging generalizations do not apply to a given patient. The bloodiest of battles has thousands of survivors.

Average results vary, of course, for different types of seizures and for different surrounding conditions. The prognosis is different also for the three main considerations, namely cessation of seizures, normal mentality and life. As regards both seizures and life, the outlook of successful drug therapy is best if the following conditions apply: in grand mal, if seizures began recently or after childhood or come infrequently or if the total number is small; if mentality is normal or if the brain is uninjured; if there is no family history of epilepsy or mental disease, and if there is sufficient money, intelligence and cooperation to follow the treatment instituted.

As regards maintenance of normal mentality, the outlook is best if seizures are petit mal but in other respects parallel the outlook for cessation of seizures.

Statistics concerning patients receiving active medical attention need to be studied with respect to their source. On the one hand the records of clinicians may be artificially optimistic. Thus Pollock [44] in 1937 saw eighty-five patients whom he had treated with bromides for more than a year. Of these, thirty-nine (46 per cent) had been without seizures for a year or more. He must have been treating an unusually mild group, for 72 per cent of the eighty-five had a previous history of a remission lasting a year or more. Probably the surviving clientele of any physician is weighted with favorable cases, for epileptic patients are notorious shoppers. They know that time is the essence of help and quite properly refuse to be under the treatment of one physician year after year if they do not experience improvement. Also the greater his reputation (and his fees) the fewer the number who can afford to continue profitless treatment.

Of any large group of patients receiving bromide or phenobarbital therapy a few (perhaps from 10 to 20 per cent) will cease to have attacks, a larger proportion (perhaps from 20 to 30 per cent) will not be helped and the majority (from 50 to 70 per cent) will receive varying degrees of benefit. These are but estimates. The proportion benefiting should be revised upward if dilantin sodium is used.

A seizure is an irregular and unpredictable symptom. In judging results of treatment the observer must remember that remissions of a year or longer occur without apparent cause in about 20 per cent of patients. Furthermore, although a pathologic condition such as "cerebral dysrhythmia" may perhaps be spoken of as "cured," a symptom such as "seizures" can only be arrested. A remission of seizures, no matter how long, may be followed by relapse. In his conduct of a case the physician will with humility realize the odds against him but will work with and not against the healing physiologic mechanisms and will remember that very small therapeutic weights may tip a heavy scale in a favorable direction.

44. Pollock, L. J.: Remissions of Attacks in Epilepsy Treated with Sodium Bromide, J. A. M. A. **110**: 632 (Feb. 26) 1938.

SUMMARY

Epilepsy is a paroxysmal cerebral dysrhythmia. The ideal drug, when found, will be a regulator of the rate of the electrical waves of the brain. Because the rate in grand mal is abnormally fast, in psychic seizures abnormally slow and in petit mal alternately fast and slow, the commonly used sedatives (which tend to slow the rate) are principally useful for grand mal.

Dilantin sodium possesses two advantages over phenobarbital: its greater effectiveness in controlling grand mal and psychomotor seizures and its absence of hypnotic effect.

818 Harrison Avenue.

Council on Physical Therapy

THE COUNCIL ON PHYSICAL THERAPY HAS AUTHORIZED PUBLICATION OF THE FOLLOWING ABSTRACT AND APPRECIATION.

HOWARD A. CARTER, Secretary.

ABSTRACT OF MINUTES, MEETING OF COUNCIL ON PHYSICAL THERAPY, DEC. 1-2, 1939

The Council on Physical Therapy held its annual meeting on Dec. 1-2, 1939, at the headquarters of the American Medical Association. The members present were Dr. Harry E. Mock, chairman, Drs. Anthony Cipollaro, William W. Coblentz, John S. Coulter, Arthur U. Desjardins, Frank D. Dickson, Walter E. Garrey, Frank H. Krusen, Frank R. Ober, Ralph Pemberton and Horatio B. Williams.

Dr. Mock was reelected chairman and Dr. Garrey vice chairman.

RESEARCH

Financial aid was awarded in the form of research grants to four investigators to assist in experimental work on the effect of heat in bone and joint repair, investigation of shielding diathermy equipment, investigation of dosage meters, and artificial respiration. The reports on previous grants awarded by the Council gave a creditable showing for the amount of money expended. Numerous requests for aid in research were considered at the meeting.

RADIO INTERFERENCE

A committee of the Council was appointed to continue the investigation relative to the most desirable means for eliminating radio interference. Reduction of power output to 325 watts, as read on a lamp load, was suggested as a minimizing influence. Nothing specific was proposed.

ROENTGEN RAYS AND RADIUM

The question of the increasing sale of small x-ray units to unqualified physicians was discussed at great length. It was agreed that there was little that could be done at the present time to discourage this practice, except perhaps to prepare articles dealing with the important phases of the problem; i. e., minimum standards for fluoroscopic equipment and the dangers of using fluoroscopes in the setting of fractures, and to give sound basic information.

The work of a group of consultants on roentgen rays was discussed. The Council was informed that two articles, one on the dangers of roentgen rays and the conditions under which their use is dangerous and one on the minimum standards for fluoroscopes, have been scheduled for publication. An article on the indiscriminate use of radium or radon by physicians without special training is to be published in the near future.

ACCEPTANCE OF SUNLAMPS

The Council revised and adopted requirements for the acceptance of sunlamps, which appeared in THE JOURNAL of January 27, 1940.

EDUCATION IN PHYSICAL THERAPY

Much progress in the activities of the Council and its consultants in the field of education was reported. The members have been engaged in giving lectures and radio talks, publishing articles and books, reorganizing and planning physical therapy departments, attending meetings, preparing motion picture films and arranging exhibits.

It was voted that the Council confer with the Council on Medical Education and Hospitals to make a concerted appeal to medical schools which are not teaching physical therapy. The Council also voted to ask the Council on Medical Education and Hospitals to send out another questionnaire on the subject of undergraduate instruction and courses for physical therapy technicians, similar to the one sent out in 1936.

Work on the revision of the Council's definitions has been started. The Council voted to have a representative group from the Council attend the conference on nomenclature scheduled for March 1940, at which time this matter could be studied.

The Council appointed the following consultants to aid the Council in its educational program: Dr. Fred Moor, Dr. Frances Baker, Dr. F. H. Ewerhardt, Dr. William Northway, Dr. Walter Solomon, Dr. Walter Zeiter, Dr. Earl C. Elkins, Dr. Arthur Watkins, Dr. Muriel Downer and Dr. Benjamin Boynton.

EXHIBIT ON LAME BACKS

In accordance with the suggestion made at the last annual meeting, preparations have been made for an exhibit on lame backs to be shown at the coming A. M. A. session.

HANDBOOK ON AMPUTATIONS

It was voted to prepare a small Handbook on Amputations, similar to the Handbook of Physical Therapy.

HEATING PADS

The Council voted not to consider electric heating pads, but it recommended that such pads have the approval of the Underwriters' Laboratories relative to safety and fire hazard.

ELECTROCARDIOGRAPHS

Owing to the fact that electrocardiograph apparatus are being widely marketed and the Council is continually being requested for information on these units, the Council deemed it advisable to take up the consideration of such apparatus. It therefore voted to seek the cooperation of the American Heart Association by asking it to appoint a group of consultants in the field to aid in the work.

AUDIOMETERS AND HEARING AIDS

Progress in the field of audiometers and hearing aids has been very satisfactory, as the result of the splendid cooperation of its consultants. At the last meeting the Council voted to publish an article reviewing the progress made in this field.

AN APPRECIATION

The Council on Physical Therapy frequently is called on to solicit the services of members of the profession who are specialists in their particular fields. During the past year the Council has received most able assistance in its work and the Council wishes to express its appreciation to the following consultants for their friendly helpfulness:

Drs. Fred L. Adair, M. Herbert Barker, William Bierman, R. C. Burt, Milton B. Cohen, Geza de Takats, Earl C. Elkins, F. H. Ewerhardt, Samuel Feinberg, Harry S. Gradle, John S. Hibben, Archibald Hoyne, K. K. Jones, Louis Katz, Disraeli Kobak, Arno Luckhardt, A. A. Martucci, C. O. Molander, Cary McCord, Tell Nelson, S. Perry Rogers, E. M. Smith Jr., Grant E. Ward, Miss Edith Quimby and Mr. S. L. Osborne.

Audiometers and Hearing Aids.—Drs. C. C. Bunch, George M. Coates, E. P. Fowler, Henry Hartig, Austin Hayden, Isaac Jones, Douglas Macfarlan, C. Stewart Nash, Horace Newhart, Paul Sabine, B. R. Shurly and W. P. Wherry.

Educational Work.—Bernard Fantus, Richard Kovacs, Franklin P. Lowry and William Schmidt.

Ophthalmologic Devices.—Drs. Francis Heed Adler, Charles A. Bahn, S. Judd Beach, William L. Benedict, Conrad Berens, Alfred Cowan, John Evans, Jonas Friedenwald, Sanford Gifford, Walter B. Lancaster, William H. Luedde and Clifford B. Walker.

Roentgen Rays and Radium.—Drs. L. F. Curtiss, William E. Chamberlain, Arthur C. Christie, Edwin C. Ernst, Gioacchino Failla, Thomas A. Groover, Fred M. Hodges, George Winslow Holmes, John T. Murphy, R. R. Newell, E. P. Pendergrass, George Pfahler, U. V. Portmann, Lauriston Taylor and J. F. Weatherwax.

Council on Pharmacy and Chemistry

NEW AND NONOFFICIAL REMEDIES

THE FOLLOWING ADDITIONAL ARTICLES HAVE BEEN ACCEPTED AS CONFORMING TO THE RULES OF THE COUNCIL ON PHARMACY AND CHEMISTRY OF THE AMERICAN MEDICAL ASSOCIATION FOR ADMISSION TO NEW AND NONOFFICIAL REMEDIES. A COPY OF THE RULES ON WHICH THE COUNCIL BASES ITS ACTION WILL BE SENT ON APPLICATION.

PAUL NICHOLAS LEECH, Secretary.

MAGNESIUM TRISILICATE.—Magnesium meso-trisilicate ($2MgO.3SiO_2.nH_2O$).—The magnesium salt of meso-(deutero-) trisilicic acid.

Actions and Uses.—It neutralizes the hydrochloric acid of the gastric juice by chemical action and probably by adsorption. It adsorbs various other substances, including alkaloids and pepsin, but it does not interfere with peptic digestion nor does it induce alkalosis. It is nontoxic in ordinary amounts, but large doses sometimes induce diarrhea because of the magnesium chloride formed. It is used for the relief of gastric hyperacidity and pain in gastric and duodenal ulcer.

Dosage.—From 1 to 4 Gm. (15 to 60 grains) before meals or food taken at other times, the single dose and the frequency of repetition depending on the degree of acidity and the relief afforded.

Magnesium trisilicate occurs as a fine, white, odorless, tasteless powder, insoluble in water and partially soluble in acids. An aqueous suspension is neutral to litmus. It completely passes through a 170 mesh sieve, and at least 85 per cent passes a 325 mesh sieve.

Transfer 5 Gm. of magnesium trisilicate to a 250 cc. beaker, add 75 cc. of distilled water, and boil for fifteen minutes. Allow the mixture to separate, decant the supernatant liquid through a filter, evaporate to dryness on the steam bath and extract with 50 cc. of water; filter and make up the resultant clear filtrate to 100 cc. Evaporate 50 cc. of this solution to dryness on a steam bath in a tared platinum dish and dry at 110 C.: the residue shall not exceed 1.2 per cent. Moisten the residue with 2 cc. of hydrofluoric acid and evaporate to dryness on the steam bath; remove the residue with 50 cc. of hot water and filter; add 1 cc. of diluted hydrochloric acid and 10 cc. of barium chloride solution, and digest for two hours. Collect the precipitate on a sintered glass filter, wash thoroughly and dry at 120 C.: the sulfate content does not exceed 0.7 per cent. To another 20 cc. portion add two drops of phenolphthalein and titrate with tenth-normal hydrochloric acid: the amount of acid required should not be more than 0.5 cc. To a 10 cc. portion add 5 cc. of silver nitrate solution and 1 cc. of nitric acid; compare with a standard containing 0.5 cc. of fifteenth-normal hydrochloric acid in 10 cc. of distilled water, following the same procedure: the chloride content shall not exceed 0.1 mg. per gram.

Transfer 3 Gm. of magnesium trisilicate to a 250 cc. beaker, add 50 cc. of distilled water and 5 cc. of hydrochloric acid; boil for twenty minutes. Nearly neutralize with ammonium hydroxide solution, filter, wash the precipitate, make the filtrate faintly alkaline to phenolphthalein with ammonium hydroxide and discharge the color with tenth-normal hydrochloric acid; add 10 cc. of hydrogen sulfide solution and compare at the end of ten minutes with a standard solution containing 0.15 mg. of lead acetate: the lead content shall not exceed 0.005 per cent.

Transfer approximately 1 Gm. of magnesium trisilicate, accurately weighed, to a covered platinum crucible and raise the temperature over a period of ten minutes to dull red heat, igniting to constant weight over a Meker burner; cool and weigh: the loss in weight shall not be more than 33 per cent nor less than 29 per cent.

Transfer approximately 1.5 Gm. of magnesium trisilicate, accurately weighed, to a 250 cc. Erlenmeyer flask, add 50 cc. of normal sulfuric acid, heat on the steam bath for fifteen minutes with frequent stirring; cool to room temperature, and titrate the excess acid with normal alkali, using methyl orange as indicator: the magnesium oxide content should not be less than 20 per cent nor more than 22 per cent.

Transfer approximately 0.7 Gm. of magnesium trisilicate, accurately weighed, to a 150 cc. beaker, add 10 cc. of normal sulfuric acid and heat on the steam bath for one and one-half hours with frequent shaking; add 25 cc. of water and heat for fifteen minutes. Decant the liquid through an ashless filter paper and wash the residue three times by decantation, finally washing it into the paper. Dry the precipitate and paper in a platinum dish and ignite over a Meker burner for one-half hour, cool and weigh. Moisten the residue with water,

add 0.5 cc. of sulfuric acid and 3 cc. of hydrofluoric acid, evaporate to dryness in a hood, finally ignite for two minutes, cool and weigh: the loss in weight due to silicon dioxide is not more than 48 per cent nor less than 45 per cent. The ratio of magnesium oxide to silicon dioxide is between 1: 2.20 and 1: 2.30.

Transfer 1 Gm. of magnesium trisilicate to a glass stoppered flask, add 16 cc. of a solution containing 5 mg. of methylene blue in each cubic centimeter and dilute to 75 cc.; shake continuously for ten minutes and at intervals during one hour. Allow the mixture to separate, and centrifuge a portion of the liquid or decant through a fine filter: the filtrate should be clear and colorless.

Magnesium Trisilicate-Mallinckrodt.—A brand of magnesium trisilicate-N. N. R.

Manufactured by Mallinckrodt Chemical Works, St. Louis, Mo. No U. S. patent or trademark.

HALIBUT LIVER OIL WITH VIOSTEROL (See New and Nonofficial Remedies, 1939, p. 517).

I. V. C. Halibut Liver Oil with Viosterol (A. R. P. I. Process) in Oil.—A brand of halibut liver oil with viosterol-N. N. R.

Manufactured by the International Vitamin Corporation, New York. No U. S. patent. U. S. trademark 314,818. The viosterol used is manufactured by the American Research Products, Inc., a subsidiary of General Mills, Inc., Minneapolis, U. S. patent 2,117,100.

Soluble Gelatin Capsules I. V. C. Halibut Liver Oil with Viosterol (A. R. P. I. Process) in Oil, 3 minims: Each capsule contains 8,500 U. S. P. units of vitamin A and 1,700 U. S. P. units of vitamin D.

I. V. C. halibut liver oil with viosterol is prepared by combining liver oil, viosterol and cod liver oil in such proportions that the finished product has the required N. N. R. vitamin A and D potency.

Council on Foods

THE COUNCIL HAS AUTHORIZED PUBLICATION OF THE FOLLOWING REPORT BY DR. ROSE IN WHICH IS PROVIDED A REVIEW OF AVAILABLE EVIDENCE ON THE NUTRITIVE VALUE OF QUICK-FROZEN FOODS. THIS REPORT WAS PREPARED BY DR. ROSE AT THE REQUEST OF THE COUNCIL. PARTLY ON THE BASIS OF THIS REPORT THE COUNCIL HAS VOTED TO GIVE CONSIDERATION TO QUICK-FROZEN VEGETABLES AND FRUITS WITH A VIEW TO INCLUSION IN THE LIST OF ACCEPTED FOODS.

FRANKLIN C. BING, Secretary.

THE EFFECT OF QUICK FREEZING ON THE NUTRITIVE VALUES OF FOODS

MARY SWARTZ ROSE, PH.D.

NEW YORK

The development of methods for the rapid reduction of the internal temperatures of food materials to very low levels has resulted in a phenomenal growth of the frozen food industry during the past ten years. According to the United States Bureau of Foreign and Domestic Commerce,[1] the quantity of quick-frozen foods in 1937 was more than 273,000,000 pounds, and an increase of 47 per cent was estimated for 1938, which would raise the production to 480,000,000 pounds. Of the total quantity marketed in 1937, approximately 50 per cent consisted of vegetables, of which nearly half were peas, 12 per cent of chicken and poultry, 12 per cent of fish, 11 per cent of fruits, of which more than half were strawberries, 9 per cent of beef and 2 per cent of lamb.[2] Fish, because of the necessity of preserving the product even for almost immediate consumption, was the first food to be commercially quick-frozen. Now the freezing of haddock and salmon fillets and codfish steaks is an important part of the fishing industry, and oysters, clams, scallops, shrimps, crab and lobster meats have been added to the list of packaged items. The quick freezing of fruits has grown out of the cold-pack berry industry of the Northwest. Besides strawberries, a great variety of other berries, cherries, apricots, grapes, pineapples, prunes, rhubarb, figs and peaches are among the fruits now being packed. Among the vegetables being successfully quick-frozen besides peas are lima beans, corn, string beans, spinach, broccoli, asparagus, brussels sprouts, artichokes and cauliflower. It has become important, therefore, to learn what changes may occur in foods subjected to this new mode of preservation and likely to be kept in storage for relatively long periods.

The task of freezing animal products is simpler than that of freezing fruits and vegetables because the animal cells are more elastic and less readily disrupted than the plant cells. The usual temperature range for rapid freezing is from —17.8 C. (0 F.) to —40 C. (—40 F.). In lowering the temperature from 0 C. (32 F.) to —26.1 C. (—15 F.) about 85 per cent of the water of the food crystallizes as ice. In the case of foods frozen slowly, the ice crystals may be many times the size of the individual cells, piercing and tearing the delicate cell walls. On defrosting this causes excessive leakage, which results in change of texture and loss of flavor. Extremely low temperatures are necessary to pass the products as rapidly as possible through the zone of maximum crystallization, 0 C. (32 F.) to —5 C. (23 F.) and obtain a temperature of —17.8 C. (0 F.) within the product. In flesh foods the colloidal gel is largely reversible and when the frozen product is thawed the cells reabsorb most of the water, but in plant products the gel is irreversible, the inelastic cell walls rupture easily and the water is not reabsorbed after thawing (Birdseye,[3] Woodruff[4]); hence fruits and vegetables lose their turgidity and original firm structure. Through the development of modern methods in quick freezing, nearly all vegetables with the exception of tomatoes, lettuce and celery can be readily frozen and stored for many months without substantial change in quality.

TYPES OF PROCESS USED IN QUICK FREEZING

There are various methods of quick freezing. The main types may be briefly classified as follows:

1. Direct immersion. The product is immersed in a refrigerated liquid, which freezes at approximately —19 C. (—2.2 F.). Fish are immersed in a sodium chloride brine and fruits in syrup, which is removed by centrifuging before the fruits are packaged.

2. Indirect immersion. The food is placed in metal containers which are immersed in a calcium chloride brine which freezes at around —40 C. (—40 F.). The containers may be made in compartments so that individual pieces can be frozen, or the food may be frozen in a solid block of water, brine or syrup ice.

3. Indirect contact, single plate method. The substance to be frozen is placed on a metal plate the under side of which is in contact with the freezing brine. In practice there may be a metal pan floating through channels of cold calcium chloride brine or a conveyer with metal plates filled with fins which drop into the cold brine. The food may or may not be packaged and may or may not be under a certain amount of compression.

4. Indirect contact, multiple plate method.

From the Nutrition Laboratory, Teachers College, Columbia University.

1. Mundee, C. R., and Porcher, F. C.: Quick-Frozen Foods, U. S. Dept. of Commerce, Bureau of Foreign and Domestic Commerce, April 1938.

2. Fisher, A. R.: The Development of the Quick-Frozen Food Industry, Butcher's Advocate **104**: 25, 1938.

3. Birdseye, Clarence: The Quick-Freezing of Perishable Foods, Ice and Refrigeration **78**: 547 (June) 1930; Where Quick-Frozen Vegetables Stand Today, Food Industries **3**: 213 (May) 1931.

4. Woodruff, J. G.: Preservation Freezing; Some Effects on Quality of Fruits and Vegetables, Bull. 168, University System of Georgia Agricultural Experiment Station, 1931.

(*a*) Double belt freezers consist of two flexible metal belts which hold the food placed between them at any desired pressure and carry it into a tunnel, where brine sprays at temperatures of from —42.8 C. (—45 F.) to —45.6 C. (—50 F.) play on the belts but do not come into contact with the food.

(*b*) Multiple plate freezers consist of several layers of hollow refrigerated metal plates in the insulated cabinets. When these are loaded with the product to be frozen the pressure is adjusted to insure perfect contact between plate and food, and the refrigerant is circulated in the plates until freezing takes place. Plates maintained at a temperature of —13 C. (8.6 F.) can completely freeze 2 inch packages of products in ninety minutes. Unpacked fish fillets and steaks can be frozen in from five to ten minutes. The plate froster may have its refrigerating machinery mounted on a frame underneath the freezing cabinet so that it can be moved from place to place for the preservation of seasonal products.

5. Spray freezing. This may mean the spraying of cold brine against the sides of metal containers or freezing the loose product on wire mesh or stainless sheet conveyers through high velocity sprays. These may be of salt brine for meats, sea foods and poultry, sugar solutions for berries and fruits, and neutral sugar-salt solutions for vegetables.

The rapid development of refrigerated lockers is stimulating the quick freezing of meats, vegetables and fruits in rural districts. In 1937 there were reported 1,300 local plants, containing some 450,000 lockers, with a total capacity of more than 100,000,000 pounds of produce and their number is rapidly increasing.

SPECIAL PROBLEMS IN SELECTION AND PREPARATION OF FOODS FOR QUICK FREEZING

The chain of steps leading from the producer to the consumer has presented many problems besides actual freezing, such as the selection of suitable varieties of fruits and vegetables, the treatment of the raw material before freezing, and the packaging, storage and transportation of the frozen products. Different varieties of the same food have manifested very different freezing qualities, and even the same variety produced under different soil or climatic conditions may vary considerably in suitability for quick freezing. Thus, of more than 100 varieties of peas, only two or three are regarded as satisfactory for quick freezing. Some fruits, for example raspberries, can be packed in a dry form without changes occurring in their flavor or texture, but others, as strawberries, lose their color and flavor unless sugar is added and have to be sliced to get a quick impregnation of sugar. Only varieties which yield firm slices are suitable for such treatment. Different varieties of peaches show marked difference in oxidative browning and change in texture and flavor.

The quality of all raw materials must, of course, be carefully safeguarded. In case of sea foods, autolysis must be prevented lest it produce distasteful changes in flavor. Hence fish are usually brought directly from the boats to the freezing plant, cleaned, washed and frozen "round" or cut into fillets of uniform size. They are also being frozen aboard the trawlers from which they are caught. Fruits are washed, cleaned, sorted, usually sliced and sometimes pulped before freezing. They are generally packed in small containers with sugar or syrup which covers the fruit and helps prevent drying and oxidation. In vegetables, freshness is of the greatest importance and the sugar content and tenderness of the raw material may determine the acceptability of the finished product. Vegetables, before being frozen, must be washed, graded, trimmed and subjected to a preliminary scalding or blanching to fix the desirable color and retard enzyme action, which is one of the causes of spoilage in storage (Diehl, Dingle and Berry,[5] Arighi, Joslyn and Marsh,[6] Tressler and Evers[7]). This process further cleanses the vegetable, decreases the number of micro-organisms and reduces the bulk. All waste is eliminated, such as shells on peas, outer leaves on brussels sprouts, skins on peaches, and fat, gristle and bone in meats, leaving the food in a form ready to cook and effecting economy of space. The waste elimination ranges from 15 to 80 per cent in meats and sea foods and from 33 to 36 per cent in frozen vegetables.

Packaging must be accomplished in moisture-proof, vapor-proof materials to minimize desiccation, and for many types of food the packages must be watertight. It is also important that the containers minimize enzymic and hydrolytic changes by preventing access of outside air. The fats of most flesh products are readily oxidized by contact with air during cold storage unless held in check by a practically airtight protective coating and low storage room temperatures. Since storage may be for long periods, it is considered essential that frozen products shall remain in perfect condition at temperatures of from —20.6 C. (—5 F.) to —23.3 C. (—10 F.) for at least nine months or a year. Paper containers are widely used in the form of cups, tubs, containers with metal top and bottom and paper sides, and rectangular cartons of various sizes. Liners of waterproof vegetable parchment papers and cellophane are used and cardboard cartons are usually cold-waxed. Outer wrappers may be of heat-sealed glassine, paraffined paper and the like. Packaging standards set up by the Northwest Frozen Foods Association in 1938 call for a consumer carton based on the size for 12 ounces of peas to be used for other vegetables regardless of weight and 2½ and 5 pound cartons for institutions. The consumer size provides servings for four people, thus giving the housewife a convenient purchasing unit. Refrigeration must be maintained during transportation; hence refrigerated railway cars must be heavily insulated. Refrigerated trucks have been designed, with silica gel and mechanical refrigeration systems built in, and low temperature is also maintained by means of solidified carbon dioxide, cans of frozen brine and various patented devices. For retail marketing, display cabinets which will hold the foods at temperatures of from —17.8 C. (0 F.) to —23.3 C. (—10 F.) are required. The expense of such cabinets has been a major problem in the distribution of frozen foods. Refrigeration may be by mechanical units built into the case which can be plugged into the regular lighting circuit or, if several cases are to be kept cold, by refrigerating equipment placed in the basement and connected with all the cabinets. Cases have also been designed to use solidified carbon dioxide, with suitable control of the evaporating carbon dioxide to insure an even temperature.

Retailing of frozen foods is still in the experimental stage. It is estimated that, of the foods packed in 1937, 5 per cent went to processors, bakeries, ice cream manufacturers and preservers, 40 per cent to hotels and institutions and 55 per cent to the retail trade.

5. Diehl, H. C.; Dingle, J. H., and Berry, J. A.: Enzymes Can Cause Off-Flavors Even When Foods Are Frozen, Food Industries **5**: 300 (Aug.) 1933.

6. Arighi, A. L.; Joslin, M. A., and Marsh, G. L.: Enzyme Activity in Frozen Vegetables, Indust. & Engin. Chem. **28**: 595 (May) 1936.

7. Tressler, D. K., and Evers, C. F.: The Freezing Preservation of Fruits, Fruit Juices and Vegetables, New York, Avi Publishing Company, Inc., 1936.

BACTERIOLOGIC RESEARCH ON QUICK-FROZEN FOODS

The value of freezing in reducing the number of microorganisms present in foods has long been recognized, but some special studies have been made of quick-frozen foods. Properly frozen and stored hamburg steak was found by Geer, Murray and Smith [8] to be consistently lower in bacterial count than the best grade of the fresh product for sale in high class meat markets. The reduction during freezing averaged 79.5 per cent and storage one month at —17.8 C. (0 F.) reduced the numbers still further. For fish fillets, Fitzgerald and Conway [9] suggest as a practical maximum a bacterial count after forty-eight hours of storage of 100,000 and recommend that if the count on any daily sample exceeds this it shall be held at —17.8 C. (0 F.) until the total number is reduced to this amount. A study of spinach and kale by Smart and Brunstetter [10] showed that blanching, freezing and storage at —8.6 C. (16.5 F.) reduced the bacterial count more than 99 per cent.

Prescott and Tanner [11] report that of typhoid bacilli very few remain alive at 0 C. (32 F.) for as long as three to five weeks and conclude that there is little danger from food frozen and stored at temperatures below 0 C. (32 F.). According to Lochhead and Jones,[12] micrococci and species of flavobacteria survive freezing much longer than other groups. When asparagus, spinach, peas, beans and corn, carefully washed and blanched, were packed and cooled as soon as possible and held at —17.8 C. (0 F.) for periods of sixteen or thirty weeks, all these products were found to harbor one or more strains of staphylococci capable of elaborating enterotoxic substances under certain circumstances. But a special test made with inoculated corn defrosted and held either in the household icebox at from 5 C. (41 F.) to 10 C. (50 F.) or in the electric refrigerator at 3.9 C. (39 F.) for two weeks was entirely negative. Fruits, because of their acidity, have fewer microorganisms than vegetables, and fruits packed with sugar have less than those packed without it. Tests for B. coli in frozen fruits, vegetables and oysters held approximately one year at —12.2 C. (10 F.) made by Fellers [13] were negative, but corn, peas and beans yielded cultures resembling B. aerogenes and B. cloacae. Berries frozen and stored for one year at —9.4 C. (15 F.) were found by Berry [14] to have a reduction of total bacteria of 99 per cent. Similar results after storage for nine months at —6.7 C. (20 F.) were obtained by Smart.[15]

The possibility of botulism occurring through the aging of frozen foods has received due consideration. Wallace and Park [16] examined various fruits and vegetables after inoculation with detoxified cultures of types A and B of Clostridium botulinum and other samples treated with a toxic culture of each of these strains and found that neither the toxins nor the spores were destroyed after being frozen for one year at —16 C. (3.2 F.), but Prescott and Geer [17] report that spinach heavily inoculated with detoxified spores of type A Clostridium botulinum and frozen at from —15 C. (5 F.) to —30 C. (—22 F.) showed no development of toxin in more than one month if held below 10 C. (50 F.). Prescott and Tanner [11] found that only small numbers of Salmonella and Clostridium botulinum can survive subjection to temperatures of from —30 C. (—22 F.) to —40 C. (—40 F.) for several weeks. On the whole, as has been pointed out by Jenkins, Tressler and Fitzgerald,[18] temperatures below —17.8 C. (0 F.) are necessary for a year's storage of quick-frozen vegetables. All investigations indicate the great importance of sanitary care of foods before freezing, holding at sufficiently low temperature during storage, and cooking promptly after thawing or without thawing at all. It is important that frozen foods be recognized as "perishable." In a very few hours after thawing there is a considerable increase in the number of bacteria.

The effect of low temperatures on encysted Trichinella spiralis has been studied by Augustine,[19] who found that raw pork can be rendered safe so far as this organism is concerned by lowering its temperature rapidly to —35 C. (—31 F.) or by lowering it to —17.8 C. (0 F.) and holding for at least twenty-four hours at that temperature. The advantage of quick over slow freezing lies in the ability to reduce with certainty the temperature of the entire piece of meat to a point at which the encysted parasites will be destroyed.

QUICK FREEZING REDUCES COOKING TIME

The cooking of quick-frozen foods presents no special problems. Practically all products may be put on to cook while still solidly frozen or immediately after partial thawing. Quick-frozen vegetables require only one half to two thirds as much time as fresh. Quick freezing renders meats more tender. Thus Tressler and his associates [20] found that grade C steak after five weeks of storage was as tender as grade A steak prior to freezing and that sirloin steaks aged four days at from 1.1 C. (34 F.) to 2.8 C. (37 F.), and then cut, packaged, quick-frozen and stored at —27.8 C. (—18 F.) for a month or longer, were as tender as steaks aged six to seven days and then tested immediately without freezing.

NUTRITIVE VALUES OF QUICK-FROZEN FOODS

Studies of the chemical composition of quick-frozen foods in relation to nutritive value have mainly been directed to the possible loss of vitamins. However, Watson and Fellers [21] investigated the effect of freezing on the proteins of the blue crab (Callinectes sapidus)

8. Geer, L. P.; Murray, W. T., and Smith, E.: Bacterial Content of Frosted Hamburg Steak, Am. J. Pub. Health **23**: 673 (July) 1933.
9. Fitzgerald, G. A., and Conway, W. S., Jr.: Sanitation and Quality Control in the Fishery Industries, Am. J. Pub. Health **27**: 1094 (Nov.) 1937.
10. Smart, Helen F., and Brunstetter, B. C.: Spinach and Kale in Frozen Pack: I. Scalding Tests; II. Microbiological Studies, Food Research **2**: 151, 1937.
11. Prescott, S. C., and Tanner, F. W.: Microbiology in Relation to Food Preservation, Food Research **3**: 189 (Jan.-April) 1938.
12. Lochhead, A. G., and Jones, A. H.: Types of Bacteria Surviving in Frozen-Pack Vegetables, Food Research **3**: 299 (May-June) 1938. Jones, A. H., and Lochhead, A. G.: A Study of Micrococci Surviving in Frozen-Pack Vegetables and Their Enterotoxic Properties, ibid. **4**: 203 (March-April) 1939.
13. Fellers, C. R.: Public Health Aspects of Frozen Foods, Am. J. Pub. Health **22**: 601 (June) 1932.
14. Berry, J. A.: Microbiology of the Frozen Pack, Canning Age **13**: 251 (April) 1932.
15. Smart, Helen F.: Further Studies on Behavior of Micro-Organisms in Frozen Cultivated Blueberries, Food Research **4**: 287 (May-June) 1939.
16. Wallace, G. I., and Park, S. E.: Microbiology of Frozen Foods: IV. Longevity of Certain Pathogenic Bacteria in Frozen Cherries and in Frozen Cherry Juice, J. Infect. Dis. **52**: 146 (March-April) 1933; V. The Behavior of Clostridium Botulinum in Frozen Fruits and in Vegetables, ibid. **52**: 150 (March-April) 1933.
17. Prescott, S. C., and Geer, L. P.: Proc. Ann. Meet., Am. Inst. Refrigeration, July 1937, p. 301.
18. Jenkins, R. R.; Tressler, D. K., and Fitzgerald, A. A.: Vitamin C in Vegetables: Storage Temperatures for Frosted Vegetables, Ice and Cold Storage **41**: 100, 1938.
19. Augustine, D. L.: Effects of Low Temperatures upon Encysted Trichinella Spiralis, Am. J. Hyg. **17**: 697 (May) 1933.
20. Tressler, D. K.; Birdseye, C., and Murray, W. T.: Tenderness of Meat: I. Determination of Relative Tenderness of Chilled and Quick-Frozen Beef, Indust. & Engin. Chem. **24**: 242 (Feb.) 1932. Tressler, D. K., and Murray, W. T.: II. Determination of Period of Aging Grade A Beef Required to Produce a Tender Quick-Frozen Product, ibid. **24**: 890 (Aug.) 1932.
21. Watson, V. K., and Fellers, C. R.: Nutritive Value of the Blue Crab (Callinectes Sapidus) and Sand Crab (Platyonichus Ocellatus Latreille), Tr. Am. Fisheries Soc. **65**: 342, 1935.

and the sand crab (Platyonichus ocellatus latreille) with negative results; and Louder and Smith,[22] comparing frozen evaporated milk with that taken directly from the can, found that young rats during a twelve week period were in equally good health and made practically the same gains in body weight on the two.

EFFECT ON VITAMIN A VALUES

With regard to the effect of quick freezing on the vitamin A values of foods, only a few investigations have been reported in which direct comparison of the same material fresh and frozen has been made, but comparisons of the values reported in the literature for a number of fresh fruits and vegetables with those found by Fitzgerald and Fellers [23] for other samples of these same foods which had been quick-frozen indicate little if any loss of the vitamin as a result of subjection to the quick freezing process. Bio-assays of vitamin A in samples of fresh and frozen spinach which were not identical but of strictly comparable origin made by DeFelice and Fellers [24] showed that the fresh spinach contained an average of 680 international units per gram as compared with 576 for frozen, and no further loss occurred in the latter after storage for three months at —17.8 C. (0 F.). Stimson, Tressler and Maynard [25] have studied the carotene content of Thomas Laxton peas at various stages in their preparation for quick freezing and find that vining, blanching, washing and sorting by brine cause little or no loss of carotene, nor was there loss in storage for eleven months at —40 C. (—40 F.). However, at —17.8 C. (0 F.) graded samples showed at this time a loss of 7 per cent and ungraded of 26 per cent. Todhunter,[26] who has determined the vitamin A value of Telephone peas preserved by the frozen pack method, finds no difference in peas scalded at different temperatures and for varying periods of time before freezing. The average vitamin A value for three varieties of peas (Telephone, Tall Alderman and Dwarf Alderman) preserved by quick freezing she found to be 10 international units per gram.

EFFECT ON VITAMIN B_1 (THIAMIN) VALUES

Losses in vitamin B_1 (thiamin) content of quick-frozen foods are due to the preliminary blanching or to cooking for the table rather than to the refrigeration. Thus Rose and Phipard [27] found no loss of vitamin B_1 in frozen peas as compared with the same peas fresh and uncooked, but there was a loss of 26 per cent brought about by cooking fifteen minutes, no cooking water being discarded. An even greater loss in short time cooking has been reported by Munsell and Kifer,[28] namely a depreciation of 50 per cent in cooking broccoli for fifteen minutes. Fellers, Esselen and Fitzgerald [29] have reported practically no loss of vitamin B_1 in frozen peas and little in spinach (8 per cent), but in the case of lima beans and asparagus the differences between fresh and frozen averaged 54 and 26 per cent respectively. The order of loss appears to vary with the blanching time, indicating again that cooking rather than freezing is responsible for the change.

EFFECT ON VITAMIN G (RIBOFLAVIN) VALUES

The vitamin G (riboflavin) content of only a few foods has been investigated and in these little or no loss due to freezing per se has been discovered. Rose and Phipard [27] compared quick-frozen peas and lima beans with the same season's crop in the fresh state and found no change due to freezing or to cooking. Fellers, Esselen and Fitzgerald [29] also found no loss in quick-frozen peas but reported a 16 per cent decrease in the vitamin G content of lima beans. Slight losses were also observed by them in asparagus and spinach, amounting to 5 and 9 per cent respectively. Canning proved much more destructive of vitamin G than freezing in the case of asparagus, lima beans and spinach, in which the losses amounted to 22, 27 and 62 per cent respectively.

EFFECT ON VITAMIN C (ASCORBIC ACID) VALUES

The widely recognized danger of loss of vitamin C (ascorbic acid) from fruits and vegetables, especially through heating and aging, has led to considerable investigation with regard to the vitamin C content of quick-frozen foods. It is now well established that the antiscorbutic value of the citrous fruits is little affected by storage for long periods at low temperatures. As early as 1925 Delf [30] showed that both orange and lemon juice stored approximately one and a half years at temperatures of from —11.0 C. (12.2 F.) to —14.0 C. (6.8 F.) were equal in vitamin C value to the original fresh material. Similar results were found by Conn and Johnson,[31] by Nelson and Mottern [32] and by Buskirk, Bacon, Tourtellotte and Fine.[33] The last named group compared fresh orange juice with quick-frozen juice after storage from six to twenty months and found the vitamin C potency of the two essentially the same.

The effect of storage at low temperature on quick-frozen blueberries, cranberries, strawberries and the juice of black currants has also been investigated. Fellers and Isham [34] found that quick freezing did not appreciably injure vitamin C in high bush blueberries (Vaccinium corymbosium), but according to Merriam and Fellers [35] defrosting and refreezing destroyed practically all of the vitamin present in the fresh fruit. The juice of the black currant (Ribes nigrum), as reported by Daniel and Munsell,[36] had the same value when fresh and when stored for two months at —10 C. (14 F.). Cranberries, frozen whole, sliced or crushed,

22. Louder, E. A., and Smith, L. S.: The Food Value of Frozen Evaporated Milk, J. Dairy Sc. **15**: 113 (March) 1932.

23. Fitzgerald, G. A., and Fellers, C. R.: Carotene and Ascorbic Acid Content of Fresh Market and Commercially Frozen Fruits and Vegetables, Food Research **3**: 109 (Jan.-April) 1938.

24. DeFelice, D., and Fellers, C. R.: Carotene Content of Fresh, Frozen, Canned and Dehydrated Spinach, Proc. Am. Horticult. Soc. **35**: 728, 1938.

25. Stimson, C. R.; Tressler, D. K., and Maynard, L. A.: Carotene (Vitamin A) Content of Fresh and Frosted Peas, Food Research **4**: 475 (Sept.-Oct.) 1939.

26. Todhunter, Elizabeth N.: Personal communication to the author.

27. Rose, Mary S., and Phipard, Esther H. F.: Vitamin B and G Values of Peas and Lima Beans Under Various Conditions, J. Nutrition **14**: 55 (July 10) 1937.

28. Munsell, Hazel E., and Kifer, H. B. The Vitamin B and G Content of Raw and Cooked Broccoli, J. Home Econ. **24**: 823 (Sept.) 1932.

29. Fellers, C. R.; Esselen, W. B., Jr., and Fitzgerald, G. A.: The Vitamin B_1 and Vitamin B_2 (G) Content of Vegetables as Influenced by Quick Freezing and Canning, Contribution 235, Massachusetts Agricultural College, Agricultural Experiment Station, 1938; see also Quick-Frozen Foods Magazine, March 1939.

30. Delf, E. M.: Influence of Storage on the Antiscurvy Value of Fruits and Vegetable Juices, Biochem. J. **19**: 141, 1925.

31. Conn, Lillian W., and Johnson, A. H.: Vitamin C Content of Frozen Orange and Grapefruit Juices, Indust. & Engin. Chem. **25**: 218 (Feb.) 1933.

32. Nelson, E. M., and Mottern, H. H.: Vitamin C Content of Frozen Orange Juice, Indust. & Engin. Chem. **25**: 216 (Feb.) 1933.

33. Buskirk, H. H.; Bacon, W. E.; Tourtellotte, D., and Fine, M. S.: Stability of Vitamin C in Frozen Orange Juice During Prolonged Storage, Indust. & Engin. Chem. **25**: 808 (July) 1933.

34. Fellers, C. R., and Isham, P. D.: Vitamins C and A in Blueberries, J. Agric. Research **47**: 163 (Aug. 1) 1933.

35. Merriam, O. A., and Fellers, C. R.: Composition and Nutritive Studies on Blueberries, Food Research **1**: 501 (Nov.-Dec.) 1936.

36. Daniel, Esther P., and Munsell, Hazel E.: Vitamin Content of Foods, Miscellaneous Publication 275, United States Dept. of Agriculture, 1937, p. 56.

were equally rich in the vitamin after storage for nine months at from —17.8 C. (0 F.) to —26 C. (—15 F.) [37] and so were strawberries, frozen with or without sugar, and stored in 1 pound wax paper cartons at —17.8 C. (0 F.) from four to seven months (Fellers and Mack [38]).

The study of vitamin C values of vegetables is beset with many difficulties. There is variability due to soil and climate; also to age and time between gathering and processing, a period during which temperature and care in handling are factors of prime importance. In case of seeds such as peas and beans there is also variability associated with seed size (Tressler, Mack, Jenkins and King [39]). A study of vegetables in the Boston market by Feener, Palmer and Fitzgerald [40] in 1937 indicated that the only green vegetables available during the winter and spring are those shipped from regions such as California, Texas, Florida and Mexico, which are from 6 to 12 days old when they arrive. In the summer months they come from nearby farms and arrive at the markets with much less delay. Vitamin C tests on spinach, broccoli, green beans and peas made weekly for one year and on asparagus for the five months in which it was available showed that all of these vegetables except the green beans contained more vitamin C during the winter months, or when otherwise protected by refrigeration, than during the warm season, when the market supply came from local sources. Rated in order of potency as received were broccoli, spinach, asparagus, green beans and peas. The degree of retention during marketing, however, was in the order of peas, beans, asparagus, broccoli and spinach. That simply cooling with ice is not sufficient to protect the vitamin C was shown by Fellers and Stepat,[41] who found that peas freshly picked and shelled and then shipped to Amherst, Mass., from Bridgeton, N. J., or Albion, N. Y., in iced half-bushel hampers lost 51 per cent of their vitamin C content after twenty-four to forty-eight hours, although on arrival they were immediately placed in cold storage at 1.7 C. (35 F.). Lima beans stored in the pod in open containers retained their vitamin C value remarkably well, the loss in three varieties after seven days of storage at 0 C. (32 F.), amounting to 11, 22 and 30 per cent respectively and at 24.8 C. (76.6 F.) to 16, 32 and 56 per cent. However, the same beans shelled and kept in moisture proof containers lost their vitamin C approximately twice as rapidly as the unshelled beans (Tressler, Mack, Jenkins and King [39]). Corn in the husk shipped in ice and requiring from one to two days for transmission loses but little vitamin C (Dunker, Fellers and Fitzgerald [42]) and can be stored at room temperature for twenty-four hours with less than 10 per cent loss. In four days of such storage, however, the loss may amount to about 50 per cent.

Practically every factor that detracts from quality also lessens the vitamin C content of vegetables. For example, the crushing and bruising of the leaves in handling spinach may cause losses as high as 60 per cent (Fitzgerald [43]) and the holding of fresh peas at room temperature for three days may result in a 50 per cent loss of the vitamin (Mack, Tressler and King [44]). Fitzgerald [43] sums these factors up as follows: "Variety, over-maturity, soil and growing conditions, holding between harvesting and blanching, lack of quick cooling following blanching, holding between blanching and freezing, storage and/or transportation at too high temperatures, and finally overcooking all detract from quality and vitamin C potency of quick frozen vegetables."

Speed is essential between harvesting and blanching because ascorbic acid oxidase is then causing loss of ascorbic acid. It is also essential in cooling, for, if all oxidizing enzymes are not inactivated by blanching, further changes will take place before the temperature of the product is sufficiently reduced to check them. In some foods the arrest of enzyme activity by blanching is necessarily incomplete because full destruction would give a product of less desirable character. Direct oxidation in air also tends to cause vitamin C loss, so that expedition between blanching and freezing becomes of utmost importance. A further source of difficulty is that excess contact with water in blanching, cooling and sorting tends to leach out soluble materials. This is shown strikingly in case of vitamin C in spinach, in which the loss during processing as reported by Dunker and Fellers [45] averaged about 45 per cent. Todhunter and Sparling [46] investigated the ascorbic acid content of peas of the Telephone variety scalded at different temperatures and for varying periods of time before freezing and found no difference in the values for peas scalded for one minute in steam or in water at 99 C. (210.2 F.), but scalding in water for three minutes at this temperature or for two, four and six minutes at 71 C. (159.8 F.) resulted in a significant loss. Later Todhunter,[26] testing three sizes of Tall Alderman peas after scalding and before freezing, found losses of 40, 34 and 33 per cent respectively in three different sizes, the smallest peas showing the greatest loss.

According to Kertesz, Dearborn and Mack,[47] ascorbic acid oxidase is completely inactivated in vegetables or in their extracts by heating to 100 C. (212 F.) for one minute. Peas frozen after sufficient heat treatment to inactivate their ascorbic acid oxidase retain a much greater portion of their original ascorbic acid than those having the active enzyme present. Similar results were obtained by Jenkins, Tressler and Fitzgerald,[48] who analyzed the factors responsible for the loss of vitamin C during commercial freezing. They found that of a total loss approximating 30 per cent when there were no delays in processing, 10 per cent was attributable to

37. Isham, P. D., and Fellers, C. R.: Effect of Manufacturing and Preserving Processes on the Vitamins of Cranberries, Bulletin 296, Massachusetts Agricultural College, Agricultural Experiment Station, 1933.

38. Fellers, C. R., and Mack, M. J.: Vitamin C in Frozen Strawberries and in Strawberry Ice Cream, Indust. & Engin. Chem. **25**: 1051 (Sept.) 1933.

39. Tressler, D. K.; Mack, G. L.; Jenkins, R. R., and King, C. G.: Vitamin C in Vegetables: VII. Lima Beans, Food Research **2**: 175, 1937.

40. Feener, S. L.; Palmer, V. W., and Fitzgerald, G. A.: Seasonal Variations in Vitamin C Content of Fresh Market Vegetables, J. Am. Soc. Refrigerating Engineers **33-34**: 101 (Aug.) 1937.

41. Fellers, C. R., and Stepat, W.: Effect of Shipping, Freezing and Canning on the Ascorbic Acid (Vitamin C) Content of Peas, Proc. Am. Horticult. Soc. **33**: 627, 1936.

42. Dunker, C. F.; Fellers, C. R., and Fitzgerald, G. A.: Stability of Vitamin C in Sweet Corn to Shipping, Freezing and Canning, Food Research **2**: 41, 1937.

43. Fitzgerald, G. A.: The Effects of Freezing on the Vitamin Content of Vegetables: A Review, Refrigerating Engineering **37**: 33 (Jan.) 1939.

44. Mack, G. L.; Tressler, D. K., and King, C. G.: Vitamin C Content of Vegetables: II. Peas, Food Research **1**: 231 (May-June) 1936.

45. Dunker, C. F., and Fellers, C. R.: Vitamin C Content of Spinach, Contribution 271, Massachusetts Agricultural College, Agricultural Experiment Station, 1939.

46. Todhunter, Elizabeth N., and Sparling, B. L.: Vitamin Values of Garden Type Peas Preserved by Frozen Pack Method: I. Ascorbic Acid (Vitamin C), Food Research **3**: 489 (Sept.-Oct.) 1938.

47. Kertesz, Z. I.; Dearborn, R. B., and Mack, G. L.: Vitamin C in Vegetables: IV. Ascorbic Acid Oxidase, J. Biol. Chem. **116**: 717 (Dec.) 1936.

48. Jenkins, R. R.; Tressler, D. K., and Fitzgerald, G. A.: Vitamin C Content of Vegetables: VIII. Frozen Peas, Food Research **3**: 133 (Jan.-April) 1938.

blanching and the remainder to cooling and washing operations subsequent to blanching. It is desirable to have the blanching time as short as is compatible with a first class product. In the case of lima beans, Tressler, Mack, Jenkins and King [39] found that with a blanching period of 150 seconds there was a loss of from 32 to 40 per cent of the ascorbic acid, but with the time shortened to forty-five seconds only 23 per cent was destroyed. In blanching artichoke hearts there is no loss of vitamin C when the material is treated for from seven to nine minutes (Joslyn, Bedford and Marsh [49]), this time being sufficient to destroy the ascorbic acid oxidase.

The influence of thawing on ascorbic acid value seems to depend primarily on the efficiency of the blanching in destroying ascorbic acid oxidase. Jenkins and his associates [48] reported no loss of vitamin C due to thawing per se, and Fenton and Tressler [50] kept certain samples of frosted peas at room temperature from one to five hours and other samples in a refrigerator at 4.4 C. (40 F.) for sixteen hours without vitamin C loss, when they had been blanched for sixty seconds in boiling water or for 120 seconds in steam.

On the other hand, Todhunter and Sparling [46] found that thawed peas removed from the original hermetically sealed containers and allowed to stand at room temperature lost 16 per cent of their ascorbic acid in thirty minutes and 27 per cent in one hour, while on standing twenty-four hours in a refrigerator at 4.4 C. (40 F.) the loss was 25 per cent. In the case of sweet corn (Dunker, Fellers and Fitzgerald [42]) the loss due to thawing is very slight, being less than 5 per cent after defrosting twenty-four hours.

Any possibility of loss by thawing can be avoided by cooking without defrosting. It is usually recommended that peas be transferred while still solidly frozen to a pan containing boiling water and cooked till tender, usually not over ten minutes. If a small quantity of water is used the vitamins soluble in water will be better conserved. Fenton and Tressler [50] found that only 5 to 15 per cent of the vitamin C was actually destroyed but that 33 to 53 per cent had gone into solution in the cooking water. Roberts [51] has also reported the loss due to solubility in the cooking water as being the greater part of the loss in cooking.

SUMMARY

Quick freezing is a mode of food preservation which affords the consumer fresh material, free from inedible waste and held in cold storage until delivery. Good quality, freshness, sanitary care, subjection to low temperatures as speedily as possible, holding at —17.8 C. (0 F.) or lower while in storage, in an airtight waterproof package, and maintenance in the frozen condition until time of using are essential conditions for producing safe foods of the highest possible nutritive value.

The number of micro-organisms in foods is greatly reduced by quick freezing. Extensive studies indicate that there is little danger from foods frozen and held in storage at temperatures below 32 F., but on thawing the organisms increase rapidly; hence frosted foods should be cooked without thawing or very soon afterward. Refreezing of products once defrosted is not safe.

Vitamin A values in foods are conserved by storage at low temperature, out of contact with light, in a practically impervious package, conditions which should prevail in the case of quick-frozen foods until delivery to the consumer. No loss of this vitamin has been observed in samples of peas held in storage for as long as eleven months at —40 C. (—40 F.).

Vitamin B_1 (thiamin) is not affected by the freezing per se but considerable loss may occur in the blanching of vegetables which have a tendency to lose vitamin B_1 in cooking. Some of these are lima beans and broccoli, in which reported losses are approximately 50 per cent and asparagus and peas, in which they amount to about 25 per cent. To conserve vitamin B_1 in quick-frozen vegetables, the blanching time should be as short as is compatible with a product satisfactory in other respects.

Little if any loss of vitamin G (riboflavin) has been observed in the quick-frozen vegetables investigated, viz. peas, lima beans, asparagus and spinach. Whatever slight loss has occurred (from 5 to 16 per cent) has been due to blanching and not to the actual freezing.

Vitamin C (ascorbic acid) in fruits appears to be conserved by quick freezing and storage at low temperatures, as shown by results with strawberries, cranberries, blueberries and the juices of the citrous fruits and of black currants. In the case of blueberries, however, defrosting and refreezing almost completely destroy the small amount of ascorbic acid which is present.

The vitamin C value of quick-frozen vegetables depends on many factors: 1. Variability in the fresh material, due to botanic variety, soil, climate, age and, in case of peas and beans, seed size. 2. Conditions between harvesting and freezing, including time in transportation, manner of packing for shipment, and temperature during shipment and while held in the market prior to processing. Thus fresh peas when shelled and packed in iced hampers may lose as much as 50 per cent of their vitamin C content if the time required for transportation is from twenty-four to forty-eight hours. 3. Blanching, cooling and holding before freezing. Speed is essential between harvesting and blanching to destroy ascorbic acid oxidase. Time, temperature and contact with water in blanching and cooling all affect vitamin C values. Minimum loss of ascorbic acid is attained when the blanching period is just sufficient to inactivate ascorbic acid oxidase and the product is cooled with all possible speed.

Loss of vitamin C in thawing takes place slowly. The final result depends partly on the completeness of the destruction of the ascorbic acid oxidase in blanching and partly on the conditions under which the food is allowed to thaw. Thus in case of frosted peas the loss may amount to as much as 25 per cent if they stand at room temperature for one hour or in a refrigerator at 4.4 C. (40 F.) for twenty-four hours. Loss in thawing can be avoided by cooking without defrosting. With careful control at all stages, the loss of vitamin C may be no more than the loss in cooking the fresh material. This has been found to be the case with peas. Loss in storage should not occur if the temperature does not rise above —17.8 C. (0. F.)

49. Joslyn, M. A.; Bedford, C. L., and Marsh, G. L.: Enzyme Activity in Frozen Vegetables: Artichoke Hearts, Indust. & Engin. Chem. **30**: 1068 (Sept.) 1938.

50. Fenton, Faith, and Tressler, D. K.: Losses of Vitamin C During Commercial Freezing, Defrosting, and Cooking of Frosted Peas, Food Research **3**: 409 (July-Aug.) 1938.

51. Roberts, V.: A Study of the Effect of Different Methods of Cooking on the Vitamin C Content of Frosted Peas, J. Home Econ. **30**: 582 (Oct.) 1938.

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8. Expansion of public health and medical services consistent with the American system of democracy.

OBITUARIES OF PHYSICIANS PUBLISHED IN 1939

The number of obituaries of physicians published in THE JOURNAL during 1939 was 3,879, of which 3,710 were of the United States and 169 of Canada. Three died in Hawaii, three in China, two each in France and the Philippine Islands, and one each in the British West Indies, Canal Zone, Egypt, Germany, Mexico, Persia and Puerto Rico. The obituaries of 116 women physicians were published, as compared with 108 in 1938. The number of graduates of medical schools in the United States for the fiscal year ended June 30, 1939, was 5,089. Deducting the number of physicians whose obituaries were published, there was a net addition to the profession for the year of 1,379, not including physicians coming to the United States from abroad.

Ages.—The average age at death of those classified as of the United States was 66.1, as compared with 65.6 in 1938. Thirty-five physicians died between the ages of 25 and 29, forty-four between 30 and 34, sixty-five between 35 and 39, 115 between 40 and 44, 148 between 45 and 49, 219 between 50 and 54, 378 between 55 and 59, 529 between 60 and 64, 632 between 65 and 69, 569 between 70 and 74, 459 between 75 and 79, 323 between 80 and 84, 140 between 85 and 89, fifty between 90 and 95, and three were 95 or over. One was 106 years old.

Causes.—Heart disease was again the leading cause of death, as it has been for many years. Some contributory causes are also included in THE JOURNAL'S tabulation as they have been in former years. For example, when a report of the cause of death gave chronic nephritis and heart disease, it was published as such in THE JOURNAL and was reported on the statistical charts under both diseases. Thus heart disease was reported as a cause of death in 1,585 cases. Endocarditis or myocarditis was specified in 373 cases, coronary thrombosis in 358, coronary occlusion in 246, angina pectoris in 72 and pericarditis in 3. Other diseases of the heart caused 534 deaths. Arteriosclerosis was the second most frequent cause, with 453. Pneumonia was the third most frequent cause with 370 deaths, of which 120 were specified as bronchopneumonia. Fourth on the list was cerebral hemorrhage with 368 deaths; 20 additional deaths were reported as due to paralysis. Of 357 deaths reported as due to cancer, the prostate gland was reported affected in 62 cases, the stomach and liver in 60, the intestine in 38 and the female genital organs in 2; in 195 cases the part affected was not specified. Nephritis was reported as the cause of 174 deaths. The number of cases in which hypertension was reported was 144, embolism and thrombosis exclusive of coronary thrombosis 113, uremia 94, other diseases of the urinary system 65, diabetes 91, diseases of the prostate other than cancer 67, tuberculosis 60, other diseases of the respiratory system 13, senility 43, cirrhosis of the liver 40, other diseases of the liver 15, appendicitis 29, influenza 28, leukemia 24, septicemia and intestinal obstruction 22 each, ulcer of the stomach 20, other diseases of the stomach 4, peritonitis 19, cholecystitis 18, paralysis agitans 15, biliary calculi 14, arthritis and pernicious anemia 13 each, Hodgkin's disease and benign tumors 11 each, encephalitis and meningitis 9 each, abscess, asthma and brain tumor 8 each, aplastic anemia and hernia 7 each, bronchitis 6 each, aneurysm, empyema and streptococcic infection of the throat 5 each, cerebral softening, pleurisy and pulmonary infarct 4 each, cerebral sclerosis, erysipelas, esophageal varix, dementia paralytica, multiple myeloma, myasthenia gravis, osteomyelitis, otitis media and subarachnoid hemorrhage 3 each, and carbuncle, diphtheria, diverticulitis of the colon, emphysema, gas bacillus infection, pellagra, sinusitis, thrombo-angiitis obliterans and undulant fever 2 each. Other diseases causing one death each as reported were Addison's disease, amebic dysentery, amyotrophic lateral sclerosis, bacillary dysentery, cerebral anemia, cerebral atrophy, cerebral compression,

cerebral infarct, chronic ergotamine tartrate poisoning, dementia praecox, diverticulum of the bladder, ectopic pregnancy, furunculosis, granulocytopenia, heat prostration, heat stroke, hemochromatosis, herpes zoster, mastoiditis, multiple sclerosis, obstructive jaundice, osteitis, paralytic ileus, paratyphoid infection, polyneuritis, pulmonary fibrosis, pyloric stenosis, Raynaud's disease, ruptured aorta, ruptured gallbladder, scarlet fever, spinal sclerosis, thrombophlebitis, toxic goiter, typhoid, typhus and urethral stricture.

Accidental Deaths.—One hundred and fifty-nine physicians died as the result of accidents in 1939, compared with 155 in the previous year. Automobile accidents accounted for 76 deaths, falls 33, burns 8, drowning 7, carbon monoxide gas 5, shooting 5, airplane accidents 3, overdose of medicine 3, train accident 2, motorcycle accident, poison and explosion 1. In 9 cases unexplained fractures were given as causes of death. One physician died from injuries received when he fell from a horse, one fell down an elevator shaft, one was injured on a golf course and one was frozen to death.

Suicides and Homicides.—Suicide was the cause of 81 deaths of physicians in 1939. Bullet wounds accounted for 35 of these deaths, poison 11, carbon monoxide poisoning 8, hanging 6, incised wounds 5, stabbing 3, jumping 2 and drowning 1. In addition, there were five cases which could not be classified because of insufficient information, for which the following causes were given: shooting 2, overdose of narcotic 2 and poison 1. There were seven homicides.

Civil Positions.—Among the decedents were 239 physicians who were or had been teachers in medical schools, 459 who had served in the World War, 55 veterans of the Spanish-American War and 8 veterans of the Civil War. One hundred and seventy were or had been health officers, 122 members of boards of education, 85 members of boards of health and 27 members of state boards of medical examiners. There were 50 who were or had been coroners, 41 mayors, 36 members of state legislatures, 33 authors, 28 bank presidents, 16 members of city councils, 13 missionaries, 12 editors, 11 police surgeons, 6 pharmacists, 5 clergymen, 5 postmasters, 4 lawyers, 3 justices of the peace, 1 congressman, 1 dentist and 1 judge. There were 25 members or former members of the United States Public Health Service, 18 of the Veterans Administration, 11 of the United States Army Medical Corps, 10 of the United States Navy Medical Corps and 4 of the Indian Medical Service.

Association Officers.—Among those who died who were or had been officers of the American Medical Association were 3 presidents, 13 section officers and 5 members of councils. Thirty-eight members or former members of the House of Delegates died during the year. There were also 46 presidents or former presidents of state medical associations and 5 secretaries.

TRENDS IN MORTALITY FROM HEART DISEASE AMONG YOUNG PERSONS

The report by Hedley [1] on the mortality from heart disease among young persons in the United States merits attention, because it would seem to confirm occasional reports [2] in the literature of a downward trend in the mortality from heart disease among young people. The report is based on information abstracted from the official mortality statistics of the U. S. Bureau of the Census, and the data cover the death rates from heart disease among persons from 5 to 24 years of age. A study of the data reveals that in every section of the country and in every state in which statistics were obtained there was a decline in the mean annual death rate from heart disease in 1930-1936 as compared with 1922-1929. The decline was often considerable. Thus, in Massachusetts the decrease amounted to about 36 per cent, while in several states the decline was over 30 per cent. The data collected from thirty-six states and the District of Columbia show that in this territory the mean annual death rate per hundred thousand from heart disease for the age period studied was 14.9 during 1930-1936 as compared with 19.7 per hundred thousand during 1922-1929, a decline of 24.4 per cent. Owing to possible inaccuracies in estimations of population, the decline indicated may not actually be as great as it appears to be at present. In any event there was apparently a rather substantial actual decline in mortality from heart disease among persons from 5 to 24 years of age during the period covered in the report of Hedley.

Since at least 80 per cent of heart disease during this age period is of rheumatic origin, it is pointed out by Hedley that the data might also serve as an index of mortality from rheumatic heart disease. It then becomes evident that, although the ultimate cause of rheumatic heart disease is unknown, there has apparently been a reduction in mortality. It is not known, however, what particular factor may be responsible for this decline. There are a number of possibilities. Some factor in the changing diet of the American people may be responsible, or perhaps rheumatic fever is becoming milder. The possibility that the diagnosis and treatment of rheumatic fever may have improved to the extent that fewer cases of severe heart disease are developing and the fact that, in general, more careful attention is being given to general health problems of children are also factors which should be considered. Even the possibility that improved housing conditions might be responsible for this decline should not be overlooked. Certainly, attempts should be made to determine the reason for the apparent decline in mortality in heart disease among young persons, and every effort should be made to give further impetus to the decline.

1. Hedley, O. F.: Pub. Health Rep. **54**: 2271 (Dec. 29) 1939.
2. Dublin, L. I., and Lotka, A. J.: Twenty-Five Years of Health Progress, Metropolitan Life Insurance Company, New York, 1937. Cohn, A. E., and Lingg, Claire: Am. Heart J. **9**: 283 (Feb.) 1934.

While the reported decrease in mortality due to heart disease among young people is encouraging, one should remain fully aware of the seriousness of the problem. Rheumatic heart disease, which for example caused more deaths among persons under 20 years of age in Philadelphia during 1936 than whooping cough, measles, diphtheria, scarlet fever, meningococcic meningitis and anterior poliomyelitis combined during this age period,[3] continues to be particularly worthy of attention.

Current Comment

THE REVISED CAPPER-EPSTEIN HEALTH INSURANCE BILL

And now comes still another edition of the health insurance bill sponsored by the American Association for Social Security through Mr. Abraham Epstein. Again this perennial was introduced in the Senate, March 25, as S. 3660, by Senator Capper, of Kansas, who has sponsored practically all previous editions. The present bill proposes a federal appropriation of $50,000,000 for the fiscal year ending June 30, 1941, and thereafter as much as may be necessary, to induce the states to embark on a combined program of compulsory and voluntary health insurance. The Social Security Board must approve all state plans. Exempted from the compulsory features of any state plan, it is proposed, will be those engaged in agricultural labor, in domestic service for an employer having less than three employees engaged in such service, and services performed by a minor who is actually in regular attendance during the day time as a student in an institution of learning. Plans must provide for cash benefits for loss due to disability and for medical benefits. The fund out of which benefits are to be payable is to be created and maintained by regular premiums paid by the state, employers and employees set according to wage classes, and by federal donations. The amount of the cash benefit to be paid an individual must be fixed according to the wage class of the individual and according to the number of his dependents. The administration of a state plan must be lodged in a central state board, a state commissioner of health insurance and a statewide system of local councils and local administrative offices. Medical benefits must be supplied to employees coming within the scope of the scheme and to their dependents. Local councils will prepare and publish lists of physicians, dentists, nurses and others who have previously agreed or with whom arrangements have been made to furnish medical benefits, and an employee will be permitted to select from such list the general medical practitioner and the general dental practitioner or the group of such practitioners by whom he wishes to be treated. For services rendered under a state plan the physician, dentist or other person or institution rendering them will be paid according to the manner of remuneration decided on by the local council, which may be a salary system, a per capita system, a fee system or a special arrangement with a group of practitioners. The federal government, the bill proposes, will contribute to any state that has an approved plan for health insurance an amount equal to one half of the total of the premiums required to be paid by a state, this part of the federal subsidy to be used exclusively for the supplying of benefits. In addition, the federal government will pay 5 per cent of the state premiums to be used for the paying of the cost of administration for administering the state plan or for benefits, or for both. The bill is pending in the Senate Committee on Education and Labor, along with the Wagner health bill, the Lodge health bill, the Wagner-George hospital construction bill, the Mead hospital construction bill and various and sundry others. This would seem to be the open season for weird efforts at plans and legislation to solve medical problems. If there is any fault inherent in any compulsory insurance system that is not present or even intensified in this new Epstein concoction, these weary eyes fail to detect its absence.

3. Hedley, O. F.: Pub. Health Rep. **52**: 1907 (Dec. 31) 1937.

"SOCIALIZED MEDICINE" AS A SLOGAN

Advocates of social theories have learned that a slogan is worth a thousand words of argument and many volumes of facts in selling ideas. Thus the phrase "socialized medicine" is being urged in the attack on the private practice of medicine. The term is almost perfectly indefinite; it may mean almost anything in the field of medicine that the listener wants it to mean. Defined as properly used in the social sciences, the term can refer only to such medical services as can be helpfully applied to the whole population, are supported by public funds and are properly administered by public authorities. Illustrations would be confined largely to public health and institutional care. This is not, however, what is meant by those who use the slogan. Such services are not, of course, opposed by organized medicine. On the contrary, they have been created and are maintained largely by the organized medical profession. The "goods" which this slogan seeks to sell are really compulsory sickness insurance. This has been found difficult to sell under its original label. Like most quack remedies, it is advertised as a panacea with careful concealment of its actual content and little demonstration of tested results where applied. Many centuries of sad experience with medical panaceas have made physicians suspicious of social ones. Like medical cure-alls, the panacea of compulsory health insurance has failed to produce promised results. Panaceas and slogans are not needed to meet the difficulties in the distribution of the cost of medical care. Scientific unbiased studies and carefully controlled experimentation may help us find solutions for our varied problems. These are the means by which medicine has made such marvelous progress in the conquest of disease and death. These are the methods now being applied by the same profession to the economic problems of medicine. The more accurate description of "politicalized medicine" or "state managed medicine" should be substituted for the misleading slogan "socialized medicine"; this will help to clear the air for a sane discussion of present problems.

ORGANIZATION SECTION

THE WAGNER-GEORGE-LEA BILL TO PROMOTE THE NATIONAL HEALTH AND WELFARE THROUGH APPROPRIATION OF FUNDS FOR THE CONSTRUCTION OF HOSPITALS

HEARINGS BEFORE THE SUBCOMMITTEE OF THE COMMITTEE ON EDUCATION AND LABOR, MARCH 18

PRESENT: SENATORS MURRAY, CHAIRMAN OF THE COMMITTEE; THOMAS OF UTAH, LAFOLLETTE OF WISCONSIN, ELLENDER OF LOUISIANA, TAFT OF OHIO, WAGNER OF NEW YORK AND GEORGE OF GEORGIA

Statement of Hon. Robert F. Wagner, Senator from the State of New York

Senator Wagner introduced into the record the bill itself, Senate 2330, and the message of the President. He stated that this is merely a modest beginning on a program tending toward a national health bill, now pending before the committee on which, he stated, it is expected the committee will present a report next year. In emphasizing the necessity for such a bill, he said that 40 per cent of the counties in the United States—inhabited by 17,000,000 people—do not have a single registered hospital or special hospital, public or private; also that only sixteen states meet sound professional standards of adequacy in respect to bed capacity in general hospitals, only twelve states in tuberculosis and only five or six in mental hospitals. For the country as a whole, said Senator Wagner, there is a deficiency of 360,000 hospital beds—most marked in rural and economically depressed areas. He emphasized his belief that in many areas hospital beds stand empty because the poor and the needy sick have not the money to pay for services which they require. Finally, he said, "Federal-state cooperation in a coordinated program to meet all these hospital needs, together with increased provision for public health, maternal and child health and general medical care, must await enactment of the bill which is pending before the committee and which I confidently expect will be reported next year."

Statement of Dr. Thomas Parran, Surgeon General of the United States Public Health Service

Dr. Parran, after introductory remarks, stated:

By requiring each community to donate the site, and through the use of relief labor, it is estimated that the charge per bed, or rather cost per bed, for a 100 bed hospital, for building and equipment, would amount to about $1,500.

SENATOR TAFT: I didn't get that about relief labor.

DR. PARRAN: By the use of relief labor in connection with the construction of the hospitals.

SENATOR TAFT: Do you figure that would make it cheaper or more expensive?

DR. PARRAN: I do not think it would make it more expensive, and it will constitute a smaller charge against the appropriation which is authorized under this bill, since these hospitals will be constructed in the most depressed areas, and presumably they are the areas in which there will be a surplus or plenty of relief labor which can be used in their construction.

SENATOR MURRAY: The labor would be supplied by the WPA?

DR. PARRAN: It would be supplied by the WPA.

SENATOR MURRAY: And would not be included in the cost of the construction of the hospitals?

DR. PARRAN: That is correct.

SENATOR ELLENDER: What would it cost otherwise, Doctor?

DR. PARRAN: It is estimated that for a 100 bed hospital the cost of material will amount to about $810 per bed, or $81,000 for a 100 bed hospital; that there will be used approximately $500 worth of relief labor per bed; that the cost of the equipment will be slightly less than $500 per bed—which makes a total of about $1,810 per bed if one includes the relief labor. Out of this appropriation for building and equipment, it is estimated that a 100 bed hospital of fire-resistant construction can be constructed at, as I have said, $1,500 a bed. Based on this estimate we would expect to provide between five and six thousand total beds. The President has talked in his message about fifty hospitals, averaging 100 beds each.

SENATOR TAFT: I am a little interested in this relief labor business. These hospitals are fireproof hospitals, aren't they, Dr. Parran?

DR. PARRAN: They will be, sir.

SENATOR TAFT: They will be made of concrete or brick?

DR. PARRAN: The Public Works Agency has done some very interesting work in connection with the preliminary plans.

SENATOR TAFT: Isn't there a prohibition against any building costing more than $55,000, erected by the government with WPA labor?

DR. PARRAN: If the committee will refer to the bill under consideration, to section 7 at the top of page 6, beginning at line 6:

> And the Federal Works Agency is further authorized to expend out of appropriations available to it, in accordance with the purposes thereof, such sums as may be necessary for the completion of the project, but without regard to specific limitations imposed on the use thereof.

That was designed to remove the $55,000 maximum limit in the current relief bill, WPA bill.

SENATOR TAFT: It seems to me that is a very doubtful policy, because the Congress definitely determined that they didn't want to use WPA labor in competition with the existing building trades labor which is unemployed, which is also looking for work. You propose that that policy be changed now?

DR. PARRAN: The President, in his message, recommended directly that WPA labor be used in the construction of these hospitals.

SENATOR TAFT: But it is a change in the policy which Congress adopted last year after a very considerable battle on the subject?

DR. PARRAN: It was not my understanding that the WPA bill excludes permanent legislation, and that it is enacted from year to year.

SENATOR TAFT: Don't you think there would be very violent objection from the labor unions, for instance, that this construction is not to be done in the usual way by contract?

DR. PARRAN: I don't feel competent to answer that question, Senator Taft. I can say that the WPA has already built a considerable number of hospitals during each of the years of its existence. I have data which I should be glad to furnish the committee in connection with that.

SENATOR ELLENDER: Dr. Parran, assuming that WPA labor cannot be used, what do you estimate the cost per room of erecting these hospitals?

DR. PARRAN: The labor cost per room has been estimated by the Public Works Agency at $500.

SENATOR ELLENDER: That is with relief labor?

DR. PARRAN: Yes, sir.

SENATOR ELLENDER: Now, assuming that you are not going to use relief labor?

DR. PARRAN: I would estimate approximately the same cost.

SENATOR ELLENDER: In other words, whether you use relief labor or not, it will cost about $1,800 per room, equipped?

DR. PARRAN: For a 100 bed hospital. One must recall that as the number of beds is reduced the cost per bed goes up very much, because one needs to provide a central heating plant and an operating room and an x-ray room and a laboratory and other facilities, all of which constitute fixed charges. Then, to add another fifty beds, once you have provided those basic facilities, results in lowering very materially the unit cost per bed.

SENATOR TAFT: You think a 100 bed hospital is an economic unit for the requirements we have in mind here?

DR. PARRAN: It is, and in fact there will be some communities in which a fifty bed unit will be all that they need at the present time.

SENATOR TAFT: Does the plan contemplate the entire cost to be borne by the federal government without any local assistance whatever?

DR. PARRAN: It does so far as construction is concerned. It contemplates that the community will donate the site, a satisfactory site, will bring water supply and sewerage facilities to the ground, and that the community will maintain the hospital without any federal assistance. It should be borne in mind that the largest cost of a hospital is not the first cost. If one figures an average, the very low average of $3 a day for the care of a patient, you can see that within two years, let us say, the cost of maintaining the bed equals the initial cost of construction.

SENATOR TAFT: Is there any plan at all for cooperative construction? Does it contemplate any possibility of cooperative construction with the locality or some private institution that may be providing hospital service?

DR. PARRAN: There would be nothing to prevent a community which now has a hospital too small for its needs, applying for an addition to that hospital, the government retaining title to that part of the hospital which it builds.

SENATOR TAFT: On Saturday I was in Marion, Va., and visited a hospital which I assume had about twenty-five beds. It was a privately organized hospital. It was supported partly with local aid. Now, they would like a larger hospital. They need more beds than twenty-five. Is there any way that they could get assistance from the federal government to expand that existing hospital instead of going in and building a brand new hospital?

DR. PARRAN: It should be possible, among other ways, as follows: The nonprofit hospital association which I assume owns it could donate the hospital to the public authorities responsible for the health and medical care in that area. The existing hospital, if it is satisfactory, could be added to. If it is not of fireproof construction, probably it could be utilized as a nurses' home and housing for the health department. Perhaps some of the laboratory service, outpatient clinic service or other service could be done there, while the new, modern, fireproof hospital could be constructed adjacent to it on the same site.

SENATOR TAFT: But that would contemplate the wiping out of the private institution and any further private cooperation in the building of the hospital?

DR. PARRAN: In the first place the bill contemplates that title to the property will rest in the federal government; secondly, that the local authorities, or local philanthropy, or local voluntary hospital, will contribute the site on which the federal hospital is to be built.

SENATOR TAFT: Do I understand this to be a federal hospital when you get through?

DR. PARRAN: Well, when the hospital is built the title will continue to reside in the people of the United States.

SENATOR TAFT: Isn't that a substantial departure from anything we have ever done in the way of general medical care for the poor that are not related in any way to the federal government, like veterans?

DR. PARRAN: It is a definitely different method of approach.

SENATOR TAFT: You mean it is a complete departure, don't you, from anything we have ever done before, to have the federal government own general hospitals for the care of the sick throughout the United States?

DR. PARRAN: So far as I know, that has never been done.

SENATOR TAFT: Do you see any necessity for that? If we are going to donate this to the locality, why shouldn't we donate it to the local government as well? We are going to make them maintain it. What is the advantage of keeping the title in the United States?

DR. PARRAN: I think there are several advantages. In the first place, when the hospital is started in a community not previously served by hospitals, usually they have some birth pains and growing pains. The physicians frequently are not accustomed to working in hospitals; the problem of establishing new hospitals with proper standards is a very important one, and all the hospital authorities and public health authorities of the country with whom we have discussed this matter have emphasized and reiterated the need for insuring proper maintenance and proper care of patients in these hospitals. The bill, under section 6, subdivision (h), on page 5, provides that these hospitals, when completed, will be leased "to the applicant for an indefinite period, the consideration for such lease being the maintenance and operation of said hospital in accordance with the provisions of this act." And among other provisions of the act, the same paragraph, section (e), provides that the Surgeon General is authorized "To secure reports and to make inspections with respect to professional service and standards of maintenance of the hospitals," et cetera.

SENATOR TAFT: Well, now, my recollection of the Wagner Act is that there is no such provision there, that it is a direct grant in aid to localities who want to build hospitals.

DR. PARRAN: There is a direct grant in aid under the Wagner so-called national health bill for aiding localities in building hospitals. There is a provision in that bill also for a flat amount per bed per year during the first three years, in order to enable the hospital to get on its feet, and there is further provision that the care of the poor patient, similarly, would be aided with federal funds. So that bill does not go so far, in terms of total commitments against the federal Treasury per bed constructed, as does the other bill of Senator Wagner.

SENATOR TAFT: But this does establish or start to establish a federal hospital system which the other bill did not?

DR. PARRAN: It does start a system of federally owned hospitals. I think it fair to say that, in discussing this matter with the authorities in the field, the point has been raised that after a certain number of years it might be desirable to have these hospitals turned over to the communities once they have demonstrated their ability to maintain and operate them. That is a provision which this, or a later Congress, might consider. In fact, under existing law, by a roundabout way it would be possible to do it. That is, if any one of these hospitals in future years were declared to be surplus to the needs of the federal government. There are already in existence laws under which they could be disposed of, presumably at a nominal price, to communities which had demonstrated their ability to operate such hospitals.

SENATOR TAFT: Do you see any objection to providing at once that, if it maintains the hospital properly for three years, the community should have title to the hospital transferred to it?

DR. PARRAN: I should like to give some consideration to that before making definite answer. As I say, there is provision in the law now which would make it possible to convey the title of a hospital to the community.

SENATOR ELLENDER: Dr. Parran, on that point what would be the objection? Supposing the community is unable to take care of the hospital, what is the government going to do? Is the government going to furnish the facilities anyhow? Is that contemplated?

DR. PARRAN: An effort has been made to safeguard, so far as possible, against that contingency, under the provisions of the bill. In the first place, the applicant must be a responsible local authority. The applicant must give insurance to the Public Health Service that—and I quote section 3, beginning at line 10:

> Said applications shall contain information necessary to establish the existence of need for hospitals, to give assurance acceptable to the Surgeon General that such hospitals will be made available under appropriate conditions to all groups of the population, will be maintained in good repair, and will be utilized in furnishing service of satisfactory quality, in accordance with regulations hereinafter authorized to be prescribed.

And then, under section 5, among other duties of the Hospital Council, composed of outstanding experts in these matters, the council is authorized to review applications for hospitals in

accordance with the section I have just read, "and recommendation of such projects as in its opinion are needed, will be adequately maintained, and otherwise will fulfil the requirements of this act."

SENATOR ELLENDER: Have you any estimate of the cost of maintaining a 100 bed hospital per day?

DR. PARRAN: The total cost, or the cost to the local taxpayers?

SENATOR ELLENDER: The total cost per day to keep it in good shape and operate it.

DR. PARRAN: If the hospital is operating at capacity the cost would vary. I would guess, per bed, it would vary from three to four dollars per day.

SENATOR ELLENDER: So that in a community in which a hospital was located, averaging $3 per bed, that would be $300 per day; and assuming 300 days per year, that would make $90,000 per year to maintain the hospital?

DR. PARRAN: Your arithmetic is correct, but one must recall that at present a considerable part of the income of general hospitals is derived from patients. For the United States as a whole, 62 per cent of all hospital income is derived from patients, 24 per cent from tax sources and 14 per cent from other sources.

SENATOR ELLENDER: Well, then it is contemplated to charge the patients for the use of the hospital?

DR. PARRAN: Presumably a patient who is able to pay would pay, and a patient who is unable to pay would be cared for through local tax funds or local philanthropic funds or otherwise.

SENATOR MURRAY: That system is in operation now in a good many hospitals in the country, is it not?

DR. PARRAN: It is a well established principle, Senator, of having public hospitals, especially in rural areas, available to the whole population, and patients paying in accordance with their ability to pay.

SENATOR MURRAY: I understand that this is not to be regarded as a very ambitious undertaking but is more in the nature of an experiment and would very likely be swallowed up in a national health measure when we finally come to enact a general national health program?

DR. PARRAN: This is frankly an experiment on a comparatively modest scale. If and when a complete national health program is enacted, it seems to me that this bill would be an integral part, would fit into, very definitely into, the whole national health program, as regards the providing of hospital facilities for rural and economically depressed areas. I said this is comparatively a modest program, for the following reason: In April of last year the Public Works Administration had before it, and had approved, hospital projects amounting in total cost to $104,000,000, ten times the appropriation authorized for the first year under this bill. Those projects have not yet been constructed, they are still pending, because the PWA has no money to allot to them. These include 8,359 beds, or nearly 60 per cent, in mental hospitals and 678 beds in institutions for the aged, 1,309 beds in tuberculosis hospitals, 4,178 beds in general hospitals. One must recall, however, that most of these projects are rather large ones, city or state projects, in that the communities which have been the first to put up this money for the WPA have been those who had naturally gotten aid in the building of the hospitals without particular regard to the relative needs of that or some other community. In addition, the WPA has constructed 4,333 beds in general hospitals. During the past five years there has been an annual average of hospitals constructed of approximately 26,000 beds per year. In other words, that is the average of replacements and new hospital beds constructed on the average each year, while this will amount to about five or six thousand beds.

SENATOR MURRAY: This will just supplement what is already going on?

DR. PARRAN: This would amount to about 25 per cent of the expected total hospital construction cost in the country.

SENATOR TAFT: We have talked about localities, but why shouldn't this program be undertaken entirely in cooperation with the states? Why should we go into the state of Georgia and build a federal hospital? Why shouldn't we go to the state of Georgia and say "Would you like to cooperate? We will be glad to furnish the money if you want to start a system of hospitals"? I can't understand the reason for a federal system of hospitals.

DR. PARRAN: Senator, these hospitals, contemplated under this act, would be built in communities which are just so poor that they just cannot, or at least up to now have been unable, to tax themselves for the construction of the hospitals.

SENATOR TAFT: But you are not asking them to construct anything. I am saying, even suppose you are going to give them 100 per cent, why can't you do it through the state, if the locality is poor? There is no state that wouldn't be prepared to administer a system of hospitals.

SENATOR MURRAY: Doesn't the bill as it stands, Doctor, contemplate the states taking part in these activities under the bill? Under section 3 it states:

> States, counties, cities, other political subdivisions or parts thereof alone or in combination wishing to participate in the benefits contemplated by this act shall make application to the Surgeon General of the Public Health Service.

DR. PARRAN: That is quite right, Mr. Chairman, and also it is required under section 6 that the Surgeon General shall cooperate with state and local health and welfare authorities and professional agencies.

SENATOR TAFT: But all the state can say is "We are glad to have you come in and set up a system of federal hospitals." Why shouldn't the states say "We can run a system of hospitals but we are too poor, and we would like some assistance and money"? You are going to ask them to maintain it anyway. I can't understand the reason for a federally operated or a federally owned system of hospitals.

DR. PARRAN: It is primarily, the thinking back of this bill is primarily that with the inducement of providing a nice modern, little hospital in the community too poor to build it for itself, that that act in itself will encourage the community to provide good care in the hospital. As you know, Senator, in a country where there is no hospital, the kind of medicine that is practiced is "kitchen surgery," and it goes back to a generation ago.

SENATOR TAFT (interposing): But I am asking about states. If one of these hospitals were built it would not be for a county. One would cover six counties, say. Say that in Mississippi there is no law that permits six counties to get together and join in maintaining a hospital at a cost of $90,000 a year, which is a considerable cost, possibly, for those counties. It seems to me that you must deal with the state of Mississippi and that state would be able to set up a system that would substantially guarantee the maintenance or else prove that the whole system would not work.

DR. PARRAN: We do expect to secure the endorsement of local projects, projects originating locally, the request originating locally, we expect to secure the endorsement of the appropriate state agency.

SENATOR TAFT: Well, in some cases nearly all the states run insane hospitals, and in Louisiana they run these general hospitals, don't they, Senator?

SENATOR ELLENDER: Six of them.

SENATOR TAFT: I can't see why the federal government has to step in. We may want to encourage the states to go ahead and set up a system of state hospitals and more or less indicate where they should be if they are to get federal money; but why should the federal government start some new project that has no relation to a federal activity?

DR. PARRAN: I see nothing unreasonable and no argument against the provisions of this bill just because it has never been done before.

SENATOR TAFT: Well, it seems to me you are stepping right over the states and a function that is clearly a state function. I am willing to admit the principle of federal aid of the states which may be poor, and that we may want to help them with money; but to step in and set up a federal hospital system seems to me absolutely in violation of the Constitution of the United States, and I don't see the slightest justification for it.

DR. PARRAN: I don't feel competent to comment on the constitutionality of the bill, Mr. Chairman. One should point out also that in addition to providing accommodations for bed

patients, just the bedding down of patients, these institutions would, in many instances, house the local health agency, the local health department, providing laboratory facilities for them, facilities for well baby clinics, venereal disease clinics, children's clinics and tuberculosis services, and so on. Among the other equipment there would of course be standard diagnostic laboratories, x-ray and various other equipment needed to enable the doctor to practice scientific medicine. One of the great troubles about health and medical care in the rural areas is that in those areas where there are not modern hospital facilities the young doctor, trained to use such facilities, hesitates to locate there; he goes to the city, which is already overcrowded. A young doctor may go into a rural area for a few years to get a little stake, and then he moves on to the city, leaving a disproportionate proportion of superannuated doctors in the rural areas, simply because the modern, well trained young medical graduate doesn't like to go out and practice "saddle-bag medicine" and "kitchen surgery." In other words, we look on these institutions as being health centers in the broadest sense. It should be noted that the bill is drafted so that the Advisory Council has a large share of responsibility, both as to the policies, as to the professional standards, and in general the administration of the act. The Surgeon General is authorized to do nothing until and unless he has consulted with the Council. A comparable device has proved very satisfactory in the administration of the National Cancer Institute Act, which also has a provision for an advisory council with which the administration of the act is shared. It should be noted that in the bill frequent reference is made to the quality of care, and in my view the necessity for insuring that quality of care is one of the most potent arguments for the federal government not to donate the hospital initially to the community. I think, Senator Taft, that consideration is probably one of the most important.

SENATOR TAFT: Why not donate it to the state, then, if they can't give it to the community?

DR. PARRAN: That is a question which might be considered, yet we are anxious not to have, shall I say, state competition, each state wanting to have proportionate part of such an appropriation. It seems to me that it is much more easy to get these hospitals located in the places where they are most needed.

SENATOR TAFT (interposing): You are going to have that competition anyway; you are going to have the same competition between states for these hospitals.

DR. PARRAN: Well, sir, I hope and firmly believe that it will be possible to locate these hospitals in those communities requesting them which need the hospitals the most.

SENATOR TAFT: I think you should certainly do so, but I am only saying that your argument about eliminating competition is not an answer to the question; you will have to resist that pressure, and no doubt you will.

SENATOR MURRAY: There will be an advisory board provided by the act, and they will have control of the proposition of where the hospitals are to be located.

DR. PARRAN: The function of the council is advisory, but they must review the various applications and they are authorized to recommend such projects as, in the opinion of the council, are needed and will be adequately maintained, and all of the responsibility of the Surgeon General is to be carried out only after conference with the Advisory Council.

SENATOR MURRAY: If the Advisory Council reported that it was not advisable to have a hospital in a certain locality where an application had been made, their advice would determine the matter?

DR. PARRAN: It would, so long as I would have anything to do with administering the act, Mr. Chairman, and I should think permanently, because none of us would like to see monuments to our own stupidity in terms of hospitals standing empty and not being maintained.

SENATOR MURRAY: You don't think that under this bill, then, hospitals would be built in sections of the country where they don't really need them and where they would be an idle investment?

DR. PARRAN: I have every confidence that they will be built only where they are urgently needed. May I give you just briefly a picture of the present situation regarding the hospitals in the country. There are 4,536 general hospitals admitted to registration by the American Medical Association. Nearly 600 of them are governmental, and nearly 2,500 are nonprofit, and nearly 1,500 of them are so-called proprietary.

SENATOR TAFT: What does that mean, do you mean owned by some doctor?

DR. PARRAN: Owned by a doctor or a profit-making corporation. Usually the proprietary hospitals are owned by individual physicians or groups of physicians. The reason why they have started the hospitals are plausible enough. Frequently a doctor wants to be a surgeon, or is a surgeon, and locates in a small town. He has no place to practice surgery. He buys an old residence, his wife is a nurse and helps to take care of the patients. First there are emergency cases, and as his reputation becomes enhanced other patients come to him. During these times many patients, not able to pay, come and ask for care. He can't, in conscience, turn them away. The result is that these proprietary hospitals frequently are really a millstone around the doctor's neck, but he has to bear that cost of doing surgery, otherwise it wouldn't be possible for him to do any surgery.

In general, the physicians who own these hospitals, especially where they are in poor physical shape and not fireproof, and so on, frequently are glad to see established a real community hospital in the broadest sense. Also some of these hospitals, most of them, have closed staffs. That means that only the doctors who are permitted by the owner to practice have any access to the hospital. If some other doctor wants to send a patient there, the patient immediately needs to be turned over to some member of the staff itself. That has acted as a deterrent to the practice of good medicine in some communities, although I wouldn't want to overemphasize that point. It would be assumed that in these public hospitals there would be assurance that all doctors eligible to practice medicine and surgery would be allowed to practice within the limits of their competence, not to practice surgery or do x-ray, but they would be eligible to practice general medicine, take care of general patients in these hospitals.

I have already given you information, I think, as to the distribution of costs of caring for patients in the hospitals. Now, on the average in the United States, there are 3.14 hospital beds per thousand of population, that is general hospitals, but that varies among the states from 4.58 in New York to Mississippi with 1.26, nearly four times as many, with relation to publication, in New York as in Mississippi.

We have undertaken to divide the counties of the United States into hospital districts, or the whole United States, shall I say, into hospital districts. District 1, a first-class district, means satisfactory hospitals and large hospitals; district 2, not so well supplied with hospitals, but at the same time not urgently in need of them; the third-class district, or district 3, a hospital with a total of less than 100 beds, and finally district 4, with no beds whatever. Now, assuming that no hospitals were built in the first two areas, we find that there is a deficiency of about 250 hospitals, rural hospitals, hospitals that serve rural areas, totaling 17,500 beds, in what we call hospital districts 3 and 4, the worst districts.

Mr. Chairman, since some of the detailed statistics concerning the prevalence of the need for hospitals and the distribution or lack of hospitals by states were put into the hearings last year, with your permission I will not go into the details of that. I should like to tell you what the present situation seems to be, in terms of the requests which have come to us, and estimates which have been made by the state health officers. We have asked all the state health officers to give us a preliminary estimate as to the number of hospitals and the number of hospital beds which they think are needed in their states. In addition, voluntary requests, which seem to be substantial requests, have come in from 122 counties in thirty-eight states, estimating that they need 104 general hospitals, eleven tuberculosis hospitals and twenty-two special hospitals or alteration of existing ones.

With your permission I would like to give you also a summary of the estimates given by the state health officers. The state health officers estimate that there are needed a total of 251 hospitals, general hospitals, with total beds 14,255, that they need 101 tuberculosis hospitals with total beds 17,269 and five special hospitals with total beds 600.

One final word, if I may, about the tuberculosis problem. We have made estimates as to the number of tuberculosis hospitals, hospital beds rather, which are needed if we are to bring all the states not up to the standard of two beds per annual death, which is the accepted one, but just to bring them up to one bed per annual death, one half of that total, and it appears that we would need about 12,000 tuberculosis hospital beds for that purpose. It does occur to me that emphasis should be placed on the need for hospitalizing open cases of tuberculosis because of the infectious nature of the disease, and because of the fact that tuberculosis is on the decline in most parts of the country. Some states, and particularly certain areas in those states, still have a high rate, and I should like to see a very intensive attack on the tuberculosis problem. I am sure that the death rate can be reduced, can be accelerated very much over what we heretofore have done, if adequate tuberculosis hospital provisions are made in these states in which now the patients cannot get into beds.

SENATOR MURRAY: Applications for hospitals of that character would come from the states; they are state operated generally, are they not?

DR. PARRAN: Generally they are. Sometimes a large county or a tuberculosis hospital district would request one, but in general it is the state. The state health officers themselves seem to have emphasized that fact in their request for 101 such hospitals.

Mr. Chairman, that concludes the statement I have to make. I have been requested by a witness who had been invited to appear here, Dr. J. N. Baker, Alabama state health officer, to submit for the record two brief statements which he has prepared.

SENATOR MURRAY: Those will be incorporated in the record.

[The statements referred to are as follows:]

Statement of Dr. J. N. Baker, Alabama State Health Officer

DR. BAKER: What of the residents of fifty-six counties in Alabama that do not maintain sanatoriums for tuberculosis? And what about the tuberculous residents of the eleven favored counties who cannot be admitted promptly because of the limited bed capacity of the relatively small institutions now in operation? Alabama, one of the two or three states having no state tuberculosis sanatoriums, is making excellent and effective use of the tuberculosis-treatment facilities at the service of her people, but the sad truth is that these facilities are wofully inadequate to deal with the tuberculosis problem as it should be dealt with.

Tuberculosis experts insist that any community—whether that be a township, a county, a state or a continent-spanning nation—should have at least one sanatorium bed for every annual death from this disease if it is really to come to grips with the problem of tuberculosis control. How sadly Alabama fails to do its full duty to its tuberculous is shown by the fact that, while more than 1,600 Alabamians died of this disease in 1938, the eight sanatoriums now in operation have a combined capacity of only 399 patients, or just about one fourth of the number regarded as adequate.

A partial survey of the Alabama hospital-care picture recently completed by the state department of health revealed that there were sixty-six general hospitals in this state, all of them situated in only thirty-eight of the state's sixty-seven counties. This total does not include specialized institutions, hospitals operated by the federal government, or small institutions which might be termed hospitals but which would be described more properly as emergency stations, because in most cases they are so poorly equipped and inadequately operated that they could hardly be expected to meet the standards set up for approval by either the American Medical Association or the State Hospital Association. Slightly more than three fifths of these sixty-six hospitals are operated as private institutions, which is to say that their primary purpose, laudable enough, is to make money for the individuals and groups of individuals by whom they were established. Not quite one third are operated as nonprofit institutions. Only one out of every ten is operated either by a city or by a county or by these two governmental units together. Twenty-nine Alabama counties—slightly more than 43 per cent of the total—have no general hospitals to care for their sick. All but four of the twenty-nine hospital-less Alabama counties are 100 per cent rural, which is another way of saying that they contain no cities or incorporated towns having populations of 2,500 or more. In not a single county in this group does the urban population number as much as 50 per cent of the total.

DR. PARRAN: Also I have a series of tables showing the needs of hospitals by areas, which, with your permission, I would like to put into the record, and also a breakdown of the number of areas, number of counties, the population, the number and bed capacity of the hospitals in the hospital areas of the several classes which I have described. Finally, Mr. Chairman, I should like to call attention to a few items in connection with the bill itself. There are a small number of technical changes which the legal counsel of the agency now is considering and on which a report will be submitted. None of the amendments contemplated would change the purpose of the bill but would clarify the meaning in a few instances. With your permission I should like to support such amendments as will be suggested by the Agency. I hope, Mr. Chairman, that your committee will give favorable consideration to this legislation, which, to my mind, is a very sound next step in connection with the development of and promotion of the national health program.

SENATOR WAGNER: Doctor, have you, in the course of your discussion of this proposal, discussed it with any of the state officials, health officials, concerned with the problems of health in their respective states?

DR. PARRAN: We have, sir.

SENATOR WAGNER: And have they generally approved the provisions of the bill?

[At this point Dr. Parran introduced into the record letters received from health officers of various states, indicating the need for hospitals in those states. These letters follow:]

Excerpts of Letters from State Health Officers Pertaining to S. 3230

DR. J. N. BAKER, Alabama: There are only two general hospitals in Alabama which are entirely charitable institutions, one in Birmingham and the other in Mobile, with a combined bed capacity of 544 beds, or only 13.3 per cent of the total general hospital beds in the state. There are twenty-nine Alabama counties without a general hospital. In the United States as a whole the ratio of beds per thousand of population is 2.7. In Alabama this figure is reduced to 1.38. Tuberculosis experts insist that any community should have at least one sanatorium bed for every annual death from this disease. More than 1,600 Alabamians died last year of tuberculosis. The eight sanatoriums now in operation have a combined capacity of 399, one fourth the number regarded as adequate.

DR. COIT I. HUGHES, Arizona: Arizona has 731 beds for tuberculosis, exclusive of those in federal hospitals. Most of the sanatoriums and hospitals are private. There is no provision whatever for the thousands of low income and indigent cases which flow yearly into Arizona without provision for medical care, housing or nutritional needs. Public facilities are the State Sanatorium at Tempe, ninety beds; Pinal County Hospital, eight beds; Pima County Hospital, forty beds. Needed are two additional hospitals with approximately 400 additional beds available for free treatment or treatment at actual cost; 270 beds in Maricopa County (in addition to the existing facility), and 130 beds in Pima County. These are to be under state administration. No report on general hospitals is made.

DR. W. B. GRAYSON, Arkansas: Arkansas does not need any new hospitals constructed right at this time, with probably two or three exceptions. I suggest that any federal funds which may be available be utilized in providing the needy sick with hospitalization in well established existing institutions before any attempt is made to indulge in any vast building program with new hospitals. Maintenance of community hospitals in Arkansas would be impossible in many instances, and quite difficult in any instance. Tuberculosis construction now being completed will provide about 700 beds; 300 or 400 additional beds are needed.

DR. WALTER M. DICKIE, California: Roughly, I would estimate that fifteen or twenty small community hospitals, with a capacity of 1,500 beds, situated throughout the rural portions of the state, are needed in communities which have no facilities, or where present facilities are obsolete or inadequate.

DR. R. L. CLEERE, Colorado: An estimate of the needs of Colorado for additional hospitals would indicate the following: 1. In the areas of greatest need, hospitals of fifty-bed capacity would not be practicable, but from eight to twelve beds would be sufficient for existing needs. In these areas it would be most difficult to secure financial responsibility for the proper maintenance of the hospitals. The hospitals should serve as

the health centers for the particular area in which they are constructed and maintained. 2. Existing services rendered by maternity homes in many areas should be improved. 3. Special diagnostic facilities would be of assistance to practicing physicians in selected areas. 4. A district tuberculosis hospital in Grand Junction would probably be desirable, owing to inadequate facilities locally and the distance from the tuberculosis hospital centers. 5. Construction of a tuberculosis hospital in Denver or Pueblo, to render care to transient cases of tuberculosis, is worthy of consideration. 6. Full-time health services should be extended to sections of the state not now being served to insure success of health and medical care programs. This objective should not be sacrificed to a program of hospital construction in isolated districts. The state has only one hospital specializing in maternity, fifteen specializing in tuberculosis, none of which are owned or operated by the state or local governments, and sixty-nine general hospitals. The greatest need in the state is indicated in the White and Yampa River valleys. In this district there are only five hospitals, the largest having twenty-one beds.

DR. STANLEY H. OSBORN, Connecticut: As a tentative and preliminary statement, the state of Connecticut does not need additional general hospitals but does need additional ward beds in urban community hospitals serving rural areas. It does need communicable disease beds in urban hospitals serving rural areas and it does need chronic beds throughout the state. For tuberculosis the state will need another 500 beds in the next five to ten years. This new institution might have a large surgical unit, as well as a medical unit, and would also be equipped to handle a fairly large outpatient service, which could be used for education, for a diagnostic center, for good after-care and also have facilities for a rehabilitation program.

DR. E. F. SMITH, Delaware: No comments.

DRS. A. B. MCCREARY, F. V. CHAPPELL and A. J. LOGIE, Florida: Owing to lack of population centers, we do not believe a general hospital of over fifty beds could be operated economically, if at all, in any part of western Florida. A hospital of fifty beds situated in Madison could serve a population of approximately 50,000 people in Madison County, about two thirds of Taylor, at least one half of Jefferson, one half of Hamilton County, and one half of Suwanee County. There is a fairly thick center of population within 20 to 30 miles of Tallahassee which should easily support a fifty-bed hospital. Another large area of the state containing the population of between 40,000 and 45,000 persons would have as its center DeFuniak Springs in Walton County. The operation of a small hospital in either Apalachicola or Port St. Joe would be entirely feasible, as a result of the rapid growth of this coastal area. If we accept the American Public Health Association's standard of two beds for each death from tuberculosis, Florida requires a total of 1,800 beds for the care of her tuberculous patients. Actually, the state lacks 1,400 of these beds. This shortage is even more acute so far as the Negro is concerned. There should be constructed two other institutions for the tuberculous, each having a 500 bed capacity. One of these institutions should be situated near Tallahassee, which is approximately half way between Orlando and Pensacola. The other institution should be situated either near Fort Myers on the west coast or near West Palm Beach on the east coast. This would place the latter institution approximately half way between Orlando and Key West.

DR. T. F. ABERCROMBIE, Georgia: Sixty-three per cent of deaths from tuberculosis are of Negroes; 36 per cent of the population consists of Negroes; 26 per cent of tuberculosis beds are for Negroes. Nothing less than an equal number of beds for Negroes can be considered at all adequate; 491 additional tuberculosis beds are required. An immediate and extremely necessary requirement is a 200 bed tuberculosis hospital for Negroes. Three hundred additional beds are needed for the domiciliary care of Negro chronic incurable open cases.

DR. H. L. MCMARTIN, Idaho: Lemhi County, the city of Salmon, with a population of approximately 2,500, has no hospital facilities of any kind available. It is doubtful whether the area could maintain a hospital without outside assistance. The most urgent need confronting the state of Idaho at the present time is that of providing adequate facilities for the hospitalization and treatment of tuberculous patients. Only two institutions exist, at Boise and Coeur d'Alene. One hundred deaths occur from tuberculosis annually. We are in immediate need of one tuberculosis hospital of at least 100 bed capacity. From 400 to 500 active cases in the state are predicted.

DR. A. C. BAXTER, Illinois: I cannot emphasize too strongly the serious need for approximately 700 tuberculosis sanatorium beds to serve the southern part of the state, which consists of forty-seven counties with an aggregate of about 1,400,000 inhabitants. Madison County is provided for satisfactorily. Alexander County recently opened a twenty bed sanatorium. St. Clair County has no construction: probably adequate facilities. It is recommended that six sanatoriums be constructed. There is a legally established and sound method of maintenance financing through the county tuberculosis sanatorium law which provides for the pooling of resources by several counties. Eighteen of forty-seven counties have already taken advantage of this law. Eleven counties have no hospital facilities of any kind. A general survey indicates a need for eight or ten new hospitals of fifty to 100 beds each.

DR. VERNE K. HARVEY, Indiana: Two general hospitals are requested in Benton and Hendricks counties. Southern Indiana probably needs additional hospital beds. The problem is one primarily of financing the present hospitals rather than the demand for additional hospitals. There is no community in the state at the present time that is farther than 30 miles from a hospital.

DR. WALTER L. BIERRING, Iowa: While there are twenty-four counties without a general hospital, each is adjacent to one, two, three or four counties in which one or more general hospitals are located. Additional general hospitals are not an immediate need in Iowa at this time. There are five existing tuberculosis sanatoriums totaling 790 beds. There is not a single hospital for tuberculosis in the western half of the state. This need could best be served by locating a new hospital of 100 beds at Sioux City in Woodbury County. Several hospitals for acute infections and contagious diseases are needed in the more populous areas of the state. The Des Moines area is mentioned.

DR. F. P. HELM, Kansas: The situation in Sedgwick County is acute. Sedgwick County Hospital is a fire trap and is not recognized by the American College of Surgeons. The county has 14,521 individuals certified as eligible by the Sedgwick County welfare board. Beds in the present institution number seventy-five. They need replacement. No adequate quarters are available for the health department. There are at present, counting the new addition at Norton, approximately 700 tuberculosis sanatorium beds available in Kansas, leaving a deficit of 400 beds to meet minimum requirements.

DR. A. T. MCCORMACK, Kentucky: There is a perfectly good new state hospital for tuberculosis which has not been opened for two years because there is no money for its support. Facilities in themselves will accomplish nothing without sufficient assured income for their continued maintenance with competent and adequate personnel. A tentative recommendation is made for four general hospitals of fifty beds each and the addition of twenty beds to each of five existing hospitals. There are seventy-two general hospitals in fifty counties of Kentucky with 57 per cent occupancy. There are seventy counties without hospital facilities. To meet the demand for beds for tuberculosis in Kentucky, there needs to be provided either six hospitals with 250 beds each or three with 500 beds each.

DR. J. A. O'HARA, Louisiana: In Louisiana there are five general hospitals with a total of 4,475 beds. I think these can properly serve our population for the next few years to come. In addition to these, there are two large hospitals at Jackson and Pineville for the insane. There is imperative need for at least 1,000 more beds for tuberculous patients, located in the northern and southwestern sections to serve about one half of the state's population. Of course, the funds for maintenance would have to be considered. Facilities consist of the tuberculosis sanatorium at Greenwell Springs, 100 beds; bids are being secured for an additional 400 bed unit; and the Dibert Memorial in connection with the New Orleans Charity Hospital, 200 patients.

DR. ROSCOE L. MITCHELL, Maine: The general consensus seems to be that our state is now quite well supplied with hospitals in all sections where communities would be able to support them, and our three tuberculosis sanatoriums now seem to be able to take care of the load in that class of patients. The Aroostock General Hospital at Houlton, a converted wooden residence, of forty beds, not soundproof, desires a fireproof wing at an estimated cost of $20,000.

DR. R. H. RILEY, Maryland: No report received.

DR. PAUL J. JAKMAUH, Massachusetts: There is no county in the state which is not served by one or more general hospitals. The adequacy of general hospital beds in Massachusetts is further indicated by a ratio of one hospital bed to 207 of population. Massachusetts has at last provided a sufficient number of tuberculosis sanatorium beds to care for actual needs. The ratio is approximately 2.7 beds per annual death. There is certainly no area in the state where any substantial increase in the number of hospital beds is warranted.

DR. H. ALLEN MOYER, Michigan: A general hospital in the central portion of the thumb district, population to be served about 65,000, a fifty bed hospital, is needed. Also a tuberculosis hospital at Houghton in the upper peninsula, a population to be served of 60,000, the aggregate number of beds from seventy-five to 100, to be a health center, housing a county health unit. I wish to submit to you the idea of establishing a state hospital limited to crippled children, to have a capacity of 100 to 150 beds, located in the central southern region of the state. A general hospital is needed at Charlotte, Eaton County; fifty beds are required, present facilities being inadequate. A general hospital at South Haven, Van Buren County, of fifty beds is required.

DR. A. J. CHESLEY, Minnesota: P. A. Surgeon Herman E. Hilleboe reports that there is no need for a general or a tuberculosis hospital, except replacements of inadequate fire traps to permit discontinuance of institutions of less than fifty bed capacity. Mr. A. M. Calvin, ex-director of the Minnesota Hospital Service Association, believes that the following places are in need of general hospitals and are quite a distance from any hospital in that area: Ely, thirty beds; Grand Marais, twenty-five beds; Baudette, twenty-five beds.

DR. FELIX J. UNDERWOOD, Mississippi: The state needs badly one 250 bed general hospital at Jackson, one 250 bed tuberculosis hospital for Negroes, one 250 bed hospital for chronic and incurable cases of tuberculosis, one large general hospital for Negroes in the Mississippi Delta and one 100 bed general hospital in north central Mississippi.

DR. HARRY F. PARKER, Missouri: The number of general hospitals needed is 110; the aggregate number of beds, 5,500. The population to be served numbers 1,500,000. Tuberculosis hospitals are needed of from five to 100 beds each.

DR. W. F. COGSWELL, Montana: The state of Montana is in urgent need of an addition to its tuberculosis sanatorium. An addition has been recently made to this sanatorium but it does not take care of all the patients who should be hospitalized. There are at the present time fifty-five on the waiting list. The sanatorium has 270 beds. A thirty bed hospital could be constructed at Circle, in McCone County.

DR. P. H. BARTHOLOMEW, Nebraska: As to construction of community hospitals in the more rural or sparsely settled areas, from present information I am unable to tender suggestions because of lack of reasonable assurance that any of such areas in this state are in an economic status that would warrant consideration of assuming the responsibility and cost of maintenance and continued operation. A 100 bed addition to the tuberculosis hospital is needed at Kearney, a 100 bed addition to the state orthopedic hospital at Lincoln and a 100 bed addition to the University of Nebraska Hospital at Omaha.

DR. EDWARD E. HAMER, Nevada: The state is fairly well fitted up so far as general hospitals are concerned, but there is not a bed in the state for tuberculosis patients. I believe that one hospital of 100 bed capacity would be sufficient to care for the tuberculosis cases in the state (population about 101,000).

DR. T. P. BURROUGHS, New Hampshire: It was the sense of the board that additional government general hospitals are not needed in New Hampshire and that there is no need for additional beds in New Hampshire for tuberculous patients and that some of the existing nonprofit hospitals of New Hampshire could be helped by building necessary additions to existing facilities.

DR. J. LYNN MAHAFFEY, New Jersey: There is a great need for the building of facilities for the care of the chronically ill and the convalescent. There is also a need for further expansion of facilities for

the care of the mentally ill, for the care of communicable diseases, for the development of a small tuberculosis sanatorium in the southern section of New Jersey, and one in the northern section.

DR. EDWIN B. GODFREY, New Mexico: One hospital, needed at Espanola to serve the southern part of Rio Arriba County, would also serve the northern part of Santa Fe County. The United Brethren of Christ might support. A hospital is needed at Albuquerque. Las Cruces, with a population of about 35,000, is interested in a hospital but I cannot see how the city of Las Cruces can finance a hospital. The state hospital at Socorro needs an additional wing.

DR. EDWARD S. GODFREY JR., New York: Schoharie County needs a fifty bed hospital at Cobleskill. Delaware County needs three small cottage type hospitals of thirty beds or so.

DR. PLUNKETT, New York: There is urgent need for at least 2,500 beds for tuberculosis cases in New York City. Erie County needs 200 additional tuberculosis beds.

DR. CARL V. REYNOLDS, North Carolina: Seven general hospitals and nine tuberculosis sanatoriums are needed, three of the latter being needed at the earliest possible time. There are thirty-eight of 100 counties in the state in which no hospital facilities are provided within the county. There are two sanatoriums for tuberculous patients already in existence and a third has been authorized, giving a total of 1,107 beds. The need could be estimated at 734 additional beds, provided either in county sanatoriums or tuberculosis wards of county homes. The nine sanatoriums requested should each have a capacity of approximately 250 beds.

DR. MAYSIL M. WILLIAMS, North Dakota: North Dakota does not need more hospitals at the present time. Only 65 per cent of the available beds have been used in the past five years. However, the state requires ambulance service of some type. There is an average of thirty-seven deaths a year in the approximately 10,000 Indian population as a result of tuberculosis. This would warrant some provision for hospitalization and isolation. However, there is some doubt as to whether state funds could be raised for the maintenance of a hospital of this kind.

DR. R. H. MARKWITH, Ohio: I think you will agree after studying the map that no one community is inaccessible to hospitals in Ohio.

DR. GRADY F. MATTHEWS, Oklahoma: The state of Oklahoma needs fifteen general hospitals of fifty beds in each. Not less than two and not more than five tuberculosis hospitals are required, with a total of about 1,400 beds.

DR. FREDERICK D. STRICKER, Oregon: The building of a hospital as a public health center would be of advantage and there are at least ten counties which could probably support a county hospital.

DR. JOHN J. SHAW, Pennsylvania: The general hospital beds per thousand of population in the United States and in Pennsylvania number 3.3. Ten counties in Pennsylvania have no general hospitals. Small hospitals of not over 100 beds may be the answer, provided maintenance can be guaranteed. This will be impracticable on the part of separate counties. Either grouping of counties for maintenance or state administration will be found necessary. The need is for more beds in existing institutions rather than more institutions for the beds. Twelve general hospitals are needed with 100 beds in each. No tuberculosis hospitals are needed at the present time. For economic administration, it is believed that these hospitals should be standardized with 100 beds each and that these be so constructed as to make of each a health center which will add greatly to the medical service of these communities in the field of preventive medicine and diagnosis. More satisfactory service will be obtained under state administration and maintenance without regard to county boundaries.

DR. LESTER J. ROUND, Rhode Island: There is need for 250 beds in tuberculosis sanatoriums. No general hospitals are required.

DR. JAMES A. HAYNE, South Carolina: Two general hospitals and tuberculosis accommodations are needed.

DR. J. F. D. COOK, South Dakota: We have many vacant beds in the general, private and church hospitals of the state. These vacant beds would be available and would meet the needs. However, owing to the low returns from agriculture, many of our people are unable to take advantage of these present available facilities in our hospitals. It is my opinion that the greatest need in South Dakota is hospital facilities for patients with acute pulmonary tuberculosis, since the present sanatorium is crowded and has a large waiting list. A 100 bed hospital is needed for the care and treatment of patients with acute pulmonary tuberculosis.

DR. W. C. WILLIAMS, Tennessee: There are forty-six counties in Tennessee without any known hospital facilities. There is no single county in this group that could provide maintenance for a hospital constructed in accordance with the President's proposal. The hope is that federal assistance might be made available not only for the construction of tuberculosis hospitals but for maintenance as well. One hospital for tuberculosis is needed in each grand division of the state with a minimum of 300 to 350 beds in each; likewise two or three general hospitals. Maintenance is not available. I suggest health centers for public health and outpatient medical services throughout the rural sections of the state. The extension of preventive measures and full utilization of present facilities will thus become more effective and efficient.

DR. GEORGE W. COX, Texas: Two tuberculosis hospitals of 1,000 beds each are needed. Exclusive of federal hospitals, Texas has a total of eighteen hospitals with a bed capacity of 2,116 for the care of tuberculosis only. A report from Dr. Charles W. Castner, chief, Eleemosynary Division, State Board of Control, as of Jan. 2, 1940, indicates a waiting list of fifty-seven white patients and fifty-eight colored patients. The state tuberculosis hospitals admit only patients who are classed as curable. The better plan would be to pay the existing facilities (physicians and hospitals) for medical care and hospitalization. The rate of pay for services could be based on the average charge for such services as are charged for like services in the communities in which these medical and hospital services are rendered. There are 390 hospitals in Texas having a bed capacity of 31,049, with 6,898 beds unoccupied. There are only two locations in Texas in which a person cannot be transported to a hospital within an hour's time, areas in East Texas and Southwest Texas.

DR. WILLIAM M. MCKAY, Utah: There are five rural areas in the state of Utah with limited economic resources where an urgent need for the establishment of a general hospital exists and in which there is every reason to believe that such institutions could and would be maintained. There are other areas in need but they would experience greater difficulty in maintaining them. The city of Roosevelt in Duchesne and Uintah counties would be a logical location for a hospital because there are five improvised and badly equipped hospitals in this vicinity. From forty to fifty beds are needed. There is under construction a twenty bed hospital, but construction has reached a point of stoppage because of lack of funds at present. In view of this development, the committee would recommend that federal funds be made available to increase the capacity of this hospital to between forty and fifty beds as originally estimated for this area. The Green River section (Grand and San Juan counties and part of Emery) needs one general hospital, of twenty-five bed capacity, located at Moab. The Garfield and Panguitch County section (county seat) needs a hospital of twenty-five bed capacity. The area embracing San Pete County needs one twenty-five to thirty bed county hospital. The Millard County area needs a twenty-five bed general hospital. A children's hospital at Salt Lake City for the use of the entire state would be desirable primarily for taking care of crippled children who are brought to Salt Lake City under the crippled children's program. There are children's wards in the existing hospitals but no children's hospital. There is also a need for a children's isolation unit for the care of communicable diseases. There is no question about the maintenance of such a hospital. The state has gone about as far as our financial conditions will permit in the matter of construction for tuberculosis purposes, yet if federal aid was available for this purpose it is felt that the state could see its way clear to maintain additional facilities of this nature.

DR. CHARLES F. DALTON, Vermont: No new hospitals are needed but there is urgent need for strengthening existing institutions and if possible supplying funds for the maintenance of free beds. Specialized hospitals are of greater benefit. I suggest a loan service to indigents, the administrator of this fund to seek for those in need of its help and urge them to take advantage of it. The administrator of this loan fund should have authority to adjust terms of payments to circumstances.

DR. I. C. RIGGIN, Virginia: The estimated population of the state of Virginia is 2,470,972. There exist eighty general hospitals and nine tuberculosis hospitals, the latter having a bed capacity of 1,691. The ratio of general hospital beds is from 2 to 3 per thousand. From 60 to 70 per cent of the beds are occupied. No statement of needs is given. If the committee, after study of the situation in Virginia, should feel that additional hospital facilities under the plan which the President is considering are indicated, I shall be glad to do anything I can toward securing the data necessary for consideration by the committee.

DR. R. H. FLETCHER, Washington: The general hospital bed situation is fairly adequate except in Benton and Klickitat counties, which need fifty beds each. On the basis of two beds per annual death, 569 additional tuberculosis beds are required. A seventy bed tuberculosis hospital is needed in Vancouver or Longview; one ninety bed hospital is needed in Yakima. Some steps have already been taken in both of these areas to provide the necessary beds but lack of sufficient funds has so far prevented construction. At least 100 additional tuberculosis beds are needed to serve Whatcom, Skagit, Snohomish, San Juan and Island counties; fifty beds are needed in Wenatchee and some additional beds are needed in Grays Harbor and Spokane counties.

DR. ARTHUR E. MCCLUE, West Virginia: There is need of 325 general hospital beds in Grant, Greenbrier, Braxton and Webster counties, and 300 beds in a tuberculosis sanatorium. It was reported in 1938 that only 50 to 70 per cent of these beds (beds available in general hospitals) were occupied. There is evidently a special need for making the beds which are already available accessible to the population that is in need of hospitalization.

DR. C. A. HARPER, Wisconsin: Clark County physicians and people have practically no reasonable general hospital facilities. I have very strong assurance that there will be no difficulty in maintaining a hospital of at least fifty beds in Clark County. A good substantial building should be constructed that will give custodial care to at least 100 maximum benefit tuberculous cases. Such a hospital could be constructed adjacent to the Statesan near Waukesha or adjacent to and supervised by one of the county institutions. The state pays to the eighteen county and two private institutions $7 a week for each patient in the institution, the counties meeting the remainder. In the state institution the state pays half and the counties half, except those patients who have no residence in any county, where the state meets all of the expense. A tuberculosis hospital should be constructed of such a type that will furnish good custodial care for the maximum benefit cases wherein the cost per week can be in the neighborhood of $7 or $8 compared with $17 to $21 in the county institutions.

DR. M. C. KEITH, Wyoming: There is one thirty-three bed sanatorium for tuberculous patients whose capacity does not meet the need of service and always has a waiting list. This institution is owned and maintained by the state. In places where there are no first class hospitals, I feel that, even if built and presented to them free of cost, the operation of such a hospital could not be maintained locally. Wyoming is fairly well supplied with hospitals. Even the more rural communities have small hospital accommodations.

SENATOR WAGNER: Did you find any opposition from any of the health officials of any of the states?

DR. PARRAN: None whatever; in fact, I have been surprised at the wish of some states who have the larger proportion, above the average, in hospital beds, to secure additional hospitals or a few additional hospitals to serve one or another area, or for tuberculosis. A few of the states, especially the Northern and Eastern states, have said that they do not believe they will need additional hospitals of this type, but it is the exception, as you will see in perusing the replies.

SENATOR WAGNER: In those cases where you find areas where the hospitals are not within reach, are there cases where they are 70 or 80 miles from the particular locality?

DR. PARRAN: There are a few, Senator, in the West and some of the sparsely populated areas, which of course constitutes a very serious problem. In the Dust Bowl Area, for example, much of the population has left. It is true that many people are a long way, 70 or 80 miles, as you say, from a hospital, but there are not enough people to support even a fifty bed or a 100 bed hospital. Just what can be done about that is a problem. Conceivably something less complete than a community hospital would be of some help, a place where there are two or three beds for emergency cases at least and where the county nurse makes her headquarters and perhaps has a little supply of serums and vaccines, which would be of some help at least to such community. We would expect to be guided largely by the wishes of the individual community, working out different types of solutions for these different problems. Most people of the country do live within 30 miles of some kind of a hospital, but what kind of a hospital is it? It often is a fire trap or a proprietary hospital, to which a person cannot gain admittance unless he can pay or somebody can pay for him. Frequently the beds are overcrowded. In other instances, however, there are proprietary hospitals which are partly empty simply because the doctors who own the hospitals can't afford to take care of the free patients in them and yet there are people who need the care.

SENATOR WAGNER: And without that care they will probably succumb to the disease?

DR. PARRAN: Frequently so.

Statement of Dr. R. G. Leland, Chicago

I have prepared for the use of the committee, if it so desires, some tables which give the costs for hospital construction, and other tables which give the cost of maintenance of hospitals. The building costs are influenced by climate, labor scale, freight rates, accessibility to building materials, methods of planning and utilizing of space, the extent and quality of built-in equipment, the ability of the architect and mechanical engineers, the number of private rooms and wards, and numerous other factors. The cost per bed varies, depending on the ratio of space occupied by patients to the total floor space of the hospital, the ratio of ward to private room space, and the facilities provided for nursing, administration, treatment, laboratory, operating room and outpatient services.

The costs of hospital construction are usually stated in terms of the cost per cubic foot. The cubic foot allowance in hospital construction varies from 5,000 to 8,000 cubic feet per bed. The costs shown in the tables which I shall leave for the committee have been figured according to various sizes of hospitals such as thirty bed, forty to fifty bed and larger—general hospitals. The information that I have collected indicates that a fifty bed hospital, with an allowance of 6,500 cubic feet per bed—the amount varies from 5,000 to 8,000 cubic feet per bed—will cost in the neighborhood of $178,750 for construction, or a cost of about $3,575 a bed. This figure is a cost estimate for the construction of hospitals by building contractors and not by the method of using WPA labor such as is contemplated for the hospitals proposed by the legislation under consideration.

SENATOR TAFT: Could you give us that for a 100 bed hospital?

DR. LELAND: The figure I stated is for a fifty bed hospital. I do not have with me a similar cost figure for a 100 bed hospital.

[Dr. Leland next explained the technic of calculating costs of hospitals on a cubic foot basis, indicating in reply to questions that the calculation includes space used for all purposes of the hospital.]

SENATOR TAFT: Can you give us the figures, say for a 100 bed hospital? Would it be twice that amount? Dr. Parran's figures related to 100 bed hospitals, and I wanted to get a comparison.

DR. LELAND: Yes. I am sorry that I do not have the exact figures for a 100 bed hospital.

SENATOR TAFT: That would be somewhat cheaper per bed, I suppose, than a fifty bed hospital?

DR. LELAND: It probably would be slightly cheaper. I have here other figures which I shall give you in just a moment which may answer that question.

SENATOR TAFT: Now going back to your main figure, you said that a fifty bed hospital, construction only, would cost $178,000. Have you got that broken down as to how that—

DR. LELAND (interposing): That is on the basis of 55 cents a cubic foot.

SENATOR TAFT: And how many cubic feet per bed?

DR. LELAND: 6,500. That includes all the items I mentioned. Fifty beds times 55 cents times 6,500.

SENATOR TAFT: Does that include equipment?

DR. LELAND: To that cost must be added the fees of the architect and consultants, which are usually about 6 per cent as I have figured it here, and the equipment, $40,000, making the total for this fifty bed project $229,475.

SENATOR TAFT: How do you account for the difference between your figures and Dr. Parran's, which would run less than $100,000 for a fifty bed hospital? His figures are approximately one third of those that you give. How do you account for that difference?

DR. LELAND: The difference might be accounted for partly by the fact that the site for these proposed hospitals is to be donated, building materials may be somewhat different than for privately constructed hospitals and may be procured on the ground, labor costs may be somewhat less, and the construction, as I have understood it from some of the engineers, is to be of a type that will be as economical and thus reduce the overall cost as much as possible.

SENATOR MURRAY: Utilizing inexpensive materials and construction methods?

DR. LELAND: Yes, sir.

SENATOR MURRAY: A much simpler style of construction than the construction that you have reference to?

DR. LELAND: The construction of hospitals is a matter which can be simplified or elaborated according to the program or the desires of those who are responsible for the hospital. Some hospitals are inordinately elaborate and unnecessarily expensive. On the other hand, it is possible to economize to the extent of making the hospital less serviceable to the community. The most satisfactory method by which to arrive at the proper amount to devote to local hospital construction is to examine carefully the specific needs of the community.

SENATOR TAFT: Are your figures an estimate or is that a consensus of what hospitals have actually cost?

DR. LELAND: These figures I have given represent the average of what hospitals have cost.

SENATOR TAFT: That is what I wanted to know.

SENATOR ELLENDER: Dr. Leland, I think Dr. Parran did state that the cost for a 100 bed hospital would be about $1,800 per bed but that, if a smaller hospital were built, the cost per unit would probably increase to $2,500, so that if you multiply that by 2 it wouldn't be exactly right?

DR. LELAND: No. The expenditures for hospitals which were constructed from July 1933 to December 1936 inclusive by the PWA are as follows: For state hospitals the average cost per bed was $2,010; state universities, $2,790; county, $2,140; city, $3,430; joint county and city, $3,810; nonprofit corporations, $2,650, and an average of the total, $2,330.

SENATOR TAFT: $2,330?

DR. LELAND: Yes, sir.

SENATOR TAFT: And they are more expensive in the cities; the rural hospitals would be somewhat cheaper?

DR. LELAND: They might be, although there is a certain cost connected with providing water, sewerage and lighting in the rural communities that might be more economically supplied in the city.

SENATOR TAFT: These figures, however, that you have given, relate only to construction and not to equipment?

DR. LELAND: That is right.

SENATOR TAFT: Dr. Parran's figures, I take it, without equipment, are about $1,300 a bed?

DR. LELAND: Yes, sir.

SENATOR TAFT: As compared to your figures of $2,000?

DR. LELAND: Dr. Parran's figures, as I understand it, did not include labor.

SENATOR TAFT: Yes, they included labor but they didn't include the site.

DR. LELAND: I did not understand that. I have another summary of nonfederal hospital projects which shows an average of approximately $3,000 per bed, showing the type of institution, such as insane asylum, schools for feebleminded, the epileptic, tuberculosis, general, charitable homes and all others.

[Dr. Leland also offered to the Committee analyses of costs of hospitals according to the total number of beds, nature of construction, and similar factors.]

DR. LELAND: The estimated total expense per bed for maintaining hospitals: I have here one table taken from the Business Census of Hospitals, showing an estimated annual expense of $678. In the different sections of the United States: Northeastern, it is given as $1,243; in the Southern, $876; Central, $1,041, and Western, $1,118. The difference in the cost of maintenance, according to the size of hospitals, is of some interest. The annual maintenance cost for hospitals of less than twenty-five beds is reported to be $808; from twenty-five to forty-nine, $884; from fifty to 149, $1,037, and 150 and over, $1,182. Figures are also shown according to the size of the county or city, whether it is a state, county or city hospital, or whether it is a nonprofit or a proprietary hospital. According to the size of hospitals, the total cost, including depreciation, per day is $6.58 per patient for less than 100 beds. The average cost per patient day for general hospitals in 1929 was $5.56, and in 1933 it was $4.51, with the special hospitals showing an average cost per patient day in 1929 of $3.44, and in 1933 of $2.74. Maintenance cost figures are also given according to the type of general hospitals, such as independent, Roman Catholic, other church hospitals, proprietary and government, and the special hospital is likewise given.

SENATOR TAFT: How do you obtain those costs? Do you get regular reports or send out a questionnaire?

DR. LELAND: Some of these figures were prepared by the Health Division of the Council of Social Agencies of Chicago. One of the tables was taken from the Hospital Survey for New York, and others were contained in *Public Health Reports*. They have been taken from various sources that are constantly making studies of this kind to determine at what cost and at what efficiency hospitals operate in order better to suggest how to improve hospital services. The figures vary throughout the country according to the type of hospital, the size of hospital and type and efficiency of its administration. They are offered merely as a record of what has been done, in order that some idea might be gained of what might be in store for those who operate the hospitals contemplated under this legislation.

SENATOR ELLENDER: Do the tables itemize the various items to make up the cost of $4.51, for instance?

DR. LELAND: Yes, sir.

SENATOR MURRAY: Doctor, the reason why these larger hospitals are so expensive is the fact that they are constructed according to architectural design, and each architect has his own notion about how a hospital should be built.

DR. LELAND: Exactly.

SENATOR ELLENDER: Then, if under this program they should design some standard style of building and use inexpensive materials, these hospitals could be constructed very cheaply in comparison to the hospitals of the country?

DR. LELAND: I would expect that a considerable number of the more expensive hospital construction items would be reduced or eliminated by a more uniform plan of construction.

Statement of Dr. Olin West, Secretary and General Manager of the American Medical Association

[Dr. West presented a statement of the general policies of the Association with respect to medical service and public health and also a copy of the statement submitted to President Franklin D. Roosevelt by representatives of the American Medical Association and the three national hospital organizations of the United States. He explained the nature of the organization of the American Medical Association and the manner in which it represents the medical profession.

Concerning the suggestion that the size of a hospital be commensurate with the needs of the community and the ability of the community to support a hospital, Dr. West said:]

DR. WEST: Now, Mr. Chairman, I think that it is highly essential that the determination of the size of the hospital that is to be built for any community shall be made with due regard to the possibility of that community utilizing a hospital of a given size and its inability to utilize a hospital of any larger size. It would, in my opinion, be folly to provide a 100 bed hospital for a community that had no possible need nor any possibility of properly administering and operating a hospital of more than thirty beds.

SENATOR MURRAY: You are familiar with the provisions of the bill which provide an advisory council which consists of the Surgeon General, as chairman, and six members appointed by the Surgeon General. "The six appointed members shall be selected from leading medical or scientific authorities who are outstanding in matters pertaining to hospitals and other public health services." Do you think that would safeguard the situation?

DR. WEST: I consider that the most important section of the bill. If these hospitals are to be built, I think it is essential that the Surgeon General shall have the advice and the aid of men who really understand the hospital problems and know all that is involved in the operation of the hospital.

SENATOR TAFT: Your principles go further than that, don't they? They require advice in any particular state from the state officials and the various medical associations connected with the state and locality?

DR. WEST: Well, that was particularly to be in connection with showing the need for hospital facilities and probably for locating hospitals. I think this bill, Mr. Chairman, places a tremendous burden on the Surgeon General and I know, because of my own personal knowledge of many operations that are conducted under his direction, that he would welcome and would lean heavily on the advice of a properly selected, competent advisory council.

(Continuing):

"3. Means for the maintenance and upkeep of such hospitals rank in importance equal to that of construction."

Now, Mr. Chairman, I confess that personally I have some doubt that a good efficient hospital can be built and equipped for $1,500 a bed. I don't believe that any hospitals that are to be built under the provisions of this bill should be ornate institutions. As a matter of fact, if these hospitals are to be built I hope they will serve as models for all communities that desire to establish hospitals, with all of the ornate frills and unnecessary furbelows left entirely out.

It is true, as one of the Senators stated a while ago, that much of the expense of construction and maintenance in some instances is due to fineries that are not essential for the operation of a good hospital. At the same time it would be folly, in my opinion, to build a hospital, whether you build it cheaply or whether you build it ornately, unless it is so arranged as to make it possible for the personnel to serve efficiently, economically and with proper care and regard for the conservation of their own strength and for the value of their services.

I have seen some of the plans that have been proposed for these hospitals, and I am quite sure that the Surgeon General and his advisory council, when it is formed, as well as the engineers in charge of construction, will see fit to make some changes in these preliminary plans.

(Continuing):

"4. Since the important objective of the program is the service it can render, hospital construction and administration, equipment, staff and personnel should meet the standards which the American Medical Association, the American College of Surgeons and the Hospital Associations regard as minimal for rendering such service in the various localities."

Now, Mr. Chairman and Gentlemen of the Committee, the organizations mentioned in this part of the statement have given a great deal of time and effort, sincere and devoted effort, to the establishment and maintenance of high standards of medical and hospital service, and they are sincerely interested that nothing shall be done that will demote or will tear

down the high standards that it has been possible so far to erect and to maintain with reasonable success.

[Dr. West also emphasized the importance of maintenance of standards and affiliation of small hospitals with larger institutions in the vicinity. He pointed out the personal factor which causes patients to pass good hospitals frequently to consult a special hospital which they desire. He called the attention of Senator George specifically to the situation in Columbus, Ga., saying:]

Now Senator George has, no doubt, in mind certain areas in his own state, and they exist in most other states for that matter, where there are hospital facilities available and some of the counties nearby that do not use these facilities, though in my opinion it would be reasonably easy to make arrangements of such nature that the facilities of existing good hospitals could be used by the people of these counties in which there are no hospital facilities. Take, for instance, at Columbus, Ga., where there is a 175 bed hospital, and it is a good hospital. Now the people in the adjoining counties do not use that hospital because it was built and is intended to serve the people of the county in which Columbus is located. But I daresay that, if the county commissioners or the county courts, or whatever the governing bodies in the counties may be, would make an arrangement with that hospital in Columbus, whereby they would pay a per diem for the care of the patients coming in to Columbus from those counties, they could be fairly well taken care of, and that the situation could be met with reasonable success.

Ambulance service and good roads will permit this type of service to operate safely, efficiently and economically in communities not financially able to support a hospital.

That is the statement that was left, filed with the President, and is submitted for such consideration as your committee may care to give it.

[Dr. West filed with the committee copies of the material published in THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION relative to this hospital bill. He then concluded:]

Now I should like to say furthermore that the American Medical Association is interested in the extension of public health service and in the extension of good medical service. There is no group, nor any organization anywhere, that has been more interested or that has more clearly shown its interest, that has exerted itself, its utmost effort for nearly a hundred years to establish and to maintain higher and better standards of medical service, and to extend medical service to all those in need. And when Congress has decided what it intends to do with respect to these matters, I should like the committee to know that the American Medical Association stands ready to make available to this committee, or to Congress, at any time, any information or any assistance of any kind that it can offer to promote any sane, reasonable and sound program for the promotion of public health and medical service.

SENATOR WAGNER: I didn't have a chance to read the pamphlet to which you referred. Does that generally speak favorably of this pending bill we are now considering?

DR. WEST: Mr. Senator, I think that I could say yes. We do feel that the bill does need some clarification. We think there are some amendments needed.

SENATOR WAGNER: I am talking about the objectives of the legislation.

DR. WEST: Nobody has ever questioned the objectives.

SENATOR TAFT: Did you find anything in the bill to indicate any possibility of cooperating with existing private hospitals or in any way assisting them?

DR. WEST: No, Senator, I don't think that that point is definitely covered. I think there are several things in the bill that need clarification, but Dr. Fishbein and Dr. Cutter are here to discuss these matters, if it please the Committee, and I should be glad to let them come before the Committee and will not impose on you further.

Statement of Morris Fishbein, Editor of The Journal of the American Medical Association, Chicago

DR. FISHBEIN: We believe that most serious consideration should be given to this bill not only because it is an experiment but primarily because experiment may set a pattern for future health legislation. Obviously this does not represent the complete needs of all of the people for medical care, as is, I believe, contemplated in the development eventually of something called a national health program. We believe that this bill was rather loosely drawn, with the idea that it would be considerably modified before having final action. I think it was Senator Wagner who said before that "bills are not written but rewritten." Therefore we have rather carefully analyzed certain phases of this bill with a view to seeing how far they meet the criteria which we believe are necessary in order to set up a reasonably safe pattern for the extension of hospital service through the national government.

The opening of the bill, section 2 particularly, assigns the sum of $10,000,000, and for each fiscal year thereafter such sums as the Congress may deem necessary for carrying out the purposes of the act. That obviously places no limitation whatever on the act. Once the pattern is set, it may be carried on by succeeding Congresses unless the bill should happen to be withdrawn at some future date by action of the Congress. It would seem to us that perhaps some limitation might be set on the eventual completion of this particular project.

Section 4 has to do with the hospital council. We believe that is the most important portion of the bill. The building and maintenance of hospitals is a specialized job in every sense of the word. It has come to be one of the most serious and important activities that we have in the country.

Now here is a committee of six, set up to advise with the Surgeon General, but obviously a committee without specific authority of any kind except to advise. It is true that, under the present Surgeon General, we could I am sure depend on his following the advice of a suitable committee for the good of the people. Again here we are dealing with the fact that the bill has no terminus of any kind. It might be best if, in some manner, it should be indicated that the committee has something in the nature of an authority. How that might be worded is a matter for those who draft bills. It would seem to me that it is a question of the approval of the committee. The Surgeon General, as chairman, with the approval of the committee, might do certain things, rather than with the advice of the committee. The committee would then be able both to advise and approve. There is a statement that "No appointed member shall be eligible to serve continuously for more than three years, but shall be eligible for reappointment if he has not served as a member of the Council at any time within twelve months immediately preceding his reappointment." About that I would merely ask Why? If you have the most competent men that you can get to serve on an advisory body, why should you drop them after three years or permit them to remain away for a year and then come back again? It would seem to me that here is a function in which the longer the men had been experienced, perhaps associated with their good health, they might be more and more valuable. So I see no reason why these men should be limited to a term of three years, which is a short time when you are building and operating hospitals.

SENATOR MURRAY: You believe in a third term principle, I assume?

[Laughter.]

DR. FISHBEIN: I refuse to answer that on advice of counsel.

There is nothing specified as to how often the committee shall meet. The committee ought to have something specific as to the frequency with which it should meet with the Surgeon General. I should take it for granted that at least once a year there ought to be a specified meeting at which they would resurvey the entire year's work and make an official report. Otherwise, they might meet on very rare occasions, indeed, since all of the authority under the present measure rests in the Surgeon General. Now if you were to begin with section 5 and make it read: "The *Council* is authorized to advise the Surgeon General with reference to the carrying out of the provisions of this act, including" to review applications, to formulate standards, to formulate rules and regulations, to review reports and inspections, then you have given your council something in the nature of authority. They are authorized to do things with the Surgeon General as chairman.

This Committee is authorized to advise the Surgeon General and the Surgeon General is authorized, in section 6, to approve hospital projects, to designate their location, and so on. The

law should be a little more specific so as to limit these actions definitely to these projects and not to hospital projects in general. You might say "to approve hospital projects provided for under this act" and "to provide training and instruction of personnel who will be required to carry out the purposes of this act." In other words, limit the function definitely to the hospitals built under this act. Perhaps it would be so limited, but in the interests of accuracy the wording might be changed so as to make it specific rather than general.

In subsection (f) you might say "including the safeguarding of the quality of service furnished in these hospitals." This would not put the Surgeon General in the position of conducting an annual survey of all hospitals, the quality of their service, their personnel, and thus creating a national hospital agency.

The question of greatest importance, and one to which Senator Taft has already referred, is the question of the extent to which the federal government undertakes to set up a chain of federal general hospitals. That is not adequately safeguarded, in our mind, under section 6 (h). It is obvious there that a mere leasing of these hospitals to the community, hospital district, state or whatever organization might be set up to conduct such a hospital, for a period of three years, under a contract which will merely cause them to maintain it consistent with the standards established, does not safeguard the nation or the state against eventually setting up a complete system of federal care of the sick.

We have thought that it might be desirable to indicate in some way what happens to these hospitals after the Surgeon General decides to terminate a lease. Should he decide to do so at the end of three years, there is nothing in the measure that says what happens to the hospital after the Surgeon General terminates the lease.

It has seemed to us possible that it might be suggested that a new lease be negotiated with some other responsible agency, if the first agency has not carried out the contract satisfactorily. Perhaps it should be sold to the state so that the state itself would take it over. But there should be specific provision as to what is done with these hospitals. The same question will come up in a much larger way some time in the future, unless there is another war, as to what is eventually to be done with the veterans' hospitals, of which there are a considerable number over the nation. It is conceivable that some day there will be a lack of occupancy.

I am not enough of a lawyer to know how one would settle this. It would seem to me possible to put in a restrictive clause to say that these hospitals shall not be conducted by the federal government. In other words, make this point doubly restrictive, not only by saying that the hospitals shall be conducted by the local agency or by the state, but to make it doubly restrictive by saying that should the lease be terminated they shall not be conducted by the federal government.

The next suggestion has to do finally with that function to which attention has already been paid, I believe by Dr. Thomas Parran in his discussion. The meaning was not clear to us of that statement which says that the Federal Works Agency is further authorized to expend out of appropriations available to itself, in accordance with the purposes thereof, such sums as may be necessary for the completion of the project but without regard to specific limitations imposed on the use thereof.

That is so broad and so loose and so completely undefined as to exactly what might be done, that it practically places no limitation on any work of this kind that might be conducted. Even the setting up of an additional $10,000,000 would not mean a thing provided the Federal Works Agency could go ahead as far as it wanted and complete any project which might be started under this act. There is no limitation whatever placed there. It could start innumerable projects and then, with the Federal Works Agency, complete them.

SENATOR TAFT: It could only provide labor, I think, however, and not materials?

DR. FISHBEIN: That is the reason it is not clear! One has to take into account work that the Federal Works Agency is entitled to do. I do not know what they can do, but I know that with the aid of the Federal Works Agency hospital construction in this country for the past five years has been steadily accelerated. The rate of hospital growth for a period of five years has been quite up to the rate of hospital growth in the previous twenty-five years and is steadily rising. The normal growth of hospital beds has been maintained steadily in this country. With the aid of the Federal Works Agency and other groups who now have money to expend there has been a fairly steady growth of hospital beds.

It seems to me, of course, that leaving the authority primarily with a council that is dependable is the real answer to the question. I do not see that it is possible for anybody at this time to endeavor to say just where these hospitals should be put down or how they are to be constructed. But if we have confidence in the Surgeon General and in the committee which he will appoint which will have some authority, we then authorize a certain appropriation and we define the principles under which that appropriation is to be expended.

I believe, for instance, from my own analysis of hospital beds and the lack of them in this country, that the one most important problem today is the provision for adequate beds for Negroes in certain states of the South. If one were to study the needs on the basis of the greatest need that exists, that would seem to be the greatest need that exists at the present time. That can be very easily seen by the tables which Dr. Cutter will leave with you, which show the available beds in various portions of the country for white and for colored and for various other purposes.

Now, the definition of a hospital, at the bottom of page 7, states: "The term 'hospital' as used in this act shall include the physical facilities necessary for the prevention, diagnosis, or treatment of disease, and for the protection of the public health." That raises a serious question in relationship to medical service, mainly the combination of the public health agency with the hospital. There are considerable differences of opinion as to whether or not the hospital in a small community shall be made, at the same time, the office of the health official who is appointed. The question of political control in the use of the hospital beds enters at once, if the public health official for the community has his office in the hospital. Since the primary problem before us today is care of the sick, it is a question whether or not it would be better here to prevent any attempt to utilize these hospitals as public health officials' offices. We might merely say that "The term 'hospital' as used in this act shall include the physical facilities necessary for the care of the sick." Finally, it is quite important that there be made available, after each of these projects is completed, if they are completed, a definite statement as to the manner by which the need was determined and the final disposition of the fund, and perhaps at a later date, if this is to be conducted as a scientific experiment, at some later date, two, three or four years hereafter, an actual report on the manner in which these institutions function.

Statement of Dr. William D. Cutter Secretary of the Council on Medical Education and Hospitals of the American Medical Association

The most complete and the most accurate figures with regard to the distribution of hospitals and hospital service are those which we have been publishing annually for a period of fifteen or twenty years. When we came before you earlier, we left with you copies of the report on hospital service for the year 1938. A new report, covering the conditions for the year 1939, will be published the last of this month. I shall be glad to see that a copy of that report is placed in the hands of each member of this committee. We have recently completed a survey of the facilities for the care of tuberculosis. Dr. Parran mentioned the importance of that problem and I should like to leave a copy of that report with you.

We have seen statements printed and published in the United States to the effect that there are in the United States something like 18 million people living in counties which have no general hospital. This may be true, but it is quite irrelevant. Hospitals can and do serve residents of other counties than the one in which they may be situated. In Illinois we have twenty-nine counties in which there are no general hospitals, but every person living in every one of those counties has access to some

hospital in an adjoining county. It is not necessary to suppose that hospitals must be built in every county. Instead of there being 18 million people who, for geographic reasons, do not have hospital facilities available, there is probably less than 2 per cent of the total population of the country which could not easily reach a hospital in case of need.

Senator Murray: All those considerations could be had in mind by the advisory committee, I assume, in determining the need for the hospital?

Dr. Cutter: Undoubtedly they would, and because it is important to investigate each one of these conditions individually we undertook about a year ago to make a study of one state. We chose Mississippi, because frequently that state has been cited as one of the states which lack adequate medical care. This was not a swivel chair survey, based on reports and documents. We had three men who worked in the state of Mississippi for periods averaging about three weeks. They visited every county, every hospital, every local health officer as far as possible; they got in touch with charitable organizations, district nursing societies and every one who might be supposed to know something about the conditions in the state of Mississippi. As a result of all these interviews they concluded that in the entire state of Mississippi there were no white persons who could not secure hospital facilities if they desired. The number of beds available for Negroes, as was just pointed out by Dr. Fishbein, was not adequate. The figures are given here, I think, in one of these tables, that I should like to leave with you. The total number of beds in the state of Mississippi, both white and Negro, is 1.5 per thousand of population. For the white population it is 2.4 and for the Negro population 0.7.

It is apparent that 2.4 beds per thousand for the white population in the state of Mississippi takes care of their demands, but it is obvious that 0.7 bed per thousand Negroes is not sufficient. However, this figure of so many beds per thousand, which is sometimes used as a criterion of the need, is not really a valid or useful measure of the need because conditions are different in the large industrial cities from what they are in the rural portions of the community. People who live in a city like New York, in apartment houses, have no way of taking care of themselves when they are sick. People who live in the country and on farms have plenty of room and they can usually get somebody to wait on them. They don't have to go to a hospital with every trifling ailment in a way that people in the large cities often do.

We would be glad to supply the members of this committee with additional copies of these documents, which I am filing here, and to give you any aid and assistance that we can possibly give you with respect to the distribution and service of hospitals in this country. We would emphasize that in determining the need one must go into a locality and determine what the conditions actually are rather than assume that need on the basis of certain statistics with reference to the number of hospitals in the county or the number of beds per thousand in the state, or something like that.

Senator Taft: Doctor, have you surveyed the other question, which seems to be more important than the construction and physical existence of hospitals, and that is the providing of money for people to be taken care of in hospitals? I mean, for instance, we may say that you may have a hospital in one county perfectly adequate to care for, say, seven counties around it, and yet there may be no law or provision by which those poor people in those communities can go to that hospital in the other county. Is there any survey of that kind of thing?

Dr. Cutter: I know of no such survey; we have made none, but that condition does exist; really that is the principal reason why people in any part of this country may be unable to secure adequate hospital service. It is a financial barrier and a lack of assumption of responsibility in the communities where they live.

Senator Taft: Isn't it a much more serious problem than the lack of hospital facilities?

Dr. Cutter: I think it is! Dr. West cited a moment ago a hospital down in Columbus, Ga., which could well take care, as far as physical facilities are concerned, of the population in several surrounding counties, but if those counties won't assume the responsibility of paying a per diem for their sick people, then that one county can't be expected to carry the full load. If those counties will not assume the responsibility of paying a per diem for their patients to go to the Columbus hospital, can it be supposed that they would assume the responsibility for a hospital in their own community?

Senator Taft: Have you any comment to make about the difference in theory between this bill and the original bill? As I understand it, the other bill provided for federal aid in the construction of hospitals only partially and required the localities to put up some money and then provided for federal assistance also for the ordinary maintenance of the hospitals, whereas this bill gives 100 per cent for the construction and provides nothing whatever for maintenance of any kind, or taking care of these people who have no other way of getting help.

Dr. Cutter: I don't believe I can offer any explanation of that, Senator. I do know that when the other bill was being considered there was some criticism offered of the provisions of that bill because on this matching basis it was supposed that certain states, in order to get some appropriation from the federal government, might be tempted to make appropriations of their own which perhaps they were not justified in doing. They would assume a bigger burden of debt just for the sake of getting some additional money from the federal government. I think it was pointed out in connection with this present bill that it was designed to avoid that particular objection. Under this bill hospitals would be built by the federal government where need was shown, and without putting any additional burden on the local community other than that of maintaining the hospital after it was erected.

Senator Taft: As I understand these figures, the cost to run it for one year is 40 per cent of the whole cost of construction.

Dr. Cutter: That is probably true, sir.

Senator Wagner: Well, Doctor, while I don't surrender for a moment any of the views expressed on the original bill, this legislation meets to a great extent the objection which the American Medical Association made to the other bill; as I recall, all of the spokesmen stressed the point that this legislation should provide for hospitalization only where there was need shown, and under no other circumstances. To that extent that objection is met by this legislation?

Dr. Cutter: I think it is wisely provided in this bill that the hospitals shall be built only where the need is shown. I wish it could be made also clear, as it was in the President's statement, that they should be built only where the ability to maintain the hospital can also be shown. The former bill provided that the federal government should assist in the maintenance. This does not.

Senator George: Isn't it included in this bill that the Advisory Council shall determine the ability of the community to maintain the hospital?

Senator Wagner: That is one of the conditions.

Senator Taft: A county that couldn't provide 1 cent to build a hospital certainly couldn't provide any maintenance at all, isn't that true? If that county is unable to make any contribution to construct the hospital, it is not going to be able to maintain the hospital; isn't that very obvious?

Dr. Cutter: Well, it might prove that way. I wouldn't like to say that there would be no exceptions to that rule, but it might turn out that a great many of these counties which were unable to make any contribution toward the construction of a hospital would find it difficult to maintain a hospital.

Senator Murray: Then no hospital would be built under those circumstances because they wouldn't qualify?

Dr. Cutter: We believe that if this bill is administered strictly in accord with that provision, to which Senator Wagner referred, it would be impossible to build hospitals in some of those communities, even though they might feel that they wanted them.

Senator George: Dr. Cutter, of course undoubtedly it is true that even if you take my state of Georgia, perhaps there are hospital beds available, although sometimes you have to

go a long distance, to most of the people who need hospitalization. But undoubtedly the great problem after all is to get the people who need hospitalization to go to the hospital, and isn't it an important factor that must always be considered, the proximity of the hospital to the people who do need hospitalization? It isn't the mere question of going across the state. My county is 80 miles, for instance, from Columbus. We have no hospital. We could go to Columbus. There are nearer hospitals than Columbus for the people of my county. But it often does occur, does it not, that people will not go those long distances for hospitalization, for hospital treatment, except where it is absolutely and imperatively necessary? The condition of the family must be kept in mind and even prejudices of the people who need medical attention must be kept in mind. If there is an available hospital, more or less under local supervision so far as its operations are concerned, many more people might go to that hospital than otherwise would go to the hospital in more remote situations, in cities, maybe. There are people in my section of the state, take our colored population, who would be utterly lost if they were carried off to a city for an operation and hospitalization; their family wouldn't feel free and wouldn't have the economic power release to visit the sick in the hospital. Consequently it is hardly a fair statement to say that, although you might find the hospital if you are able financially to go and find it, you really have any adequate hospital facilities, because somewhere within the range of the patient is an available hospital.

DR. CUTTER: Senator, I think all of the conditions you have mentioned must be taken into consideration. The accessibility and the availability of a hospital vary of course with geographic location. There may be mountains, there may be unbridged rivers, there may be swamps, there may be no road. On the other hand, in a perfectly level country like Illinois, with good roads, it is easy to transport people 20 or 25 miles. But the real question is not the question of the distance which a patient might have to go, the question is whether, closer to his home, an adequate hospital could be maintained. We have heard a good deal said this morning about the financial responsibility for maintaining these hospitals, and that question is important. But there is another question which is of even greater importance! That is the question of whether you can provide an adequate personnel to operate the hospital.

SENATOR GEORGE: That is true.

DR. CUTTER: Just putting up a hospital where there aren't adequately trained doctors is likely to do more harm than good. Unless you have adequately trained doctors in that hospital you won't be serving the best interests of your patients by bringing a hospital close to their door, and you can't expect adequately trained doctors to stay in a hospital unless they have a sufficient volume of work to keep them busy. A surgeon, for example, who operates only once a week isn't going to be very long a good surgeon. Unless the population surrounding the hospital, and tributary to it, and availing themselves of it, is of sufficient magnitude so that there is a sufficient volume of illness coming into the hospital to keep a well trained staff of physicians occupied, you are not going to get the best kind of service in that institution. That has to be kept in mind in considering this question of the need and ability of the community to support a hospital.

SENATOR TAFT: If you started off to create an ideal hospital system in a state, you wouldn't put a hospital in every county seat in a state like Illinois, would you?

DR. CUTTER: You couldn't possibly do it.

SENATOR TAFT: It would be much more satisfactory to consolidate them in certain units to cover the entire state?

DR. CUTTER: Absolutely! Within certain limits the larger the staff of the hospital, and the larger the hospital, the more efficient service you can render. You can have more specialists of different kinds, more special equipment and more specially trained nurses, and you can render in general a better character of service in a hospital which has 100 or 200 patients a day than in a hospital which has only twenty-five or thirty. The best interests of the people would be observed by putting good hospitals which can be well staffed and well maintained in just as many places as there are communities able to support them. Then encourage the other people who live in communities where they can't support such hospitals either to have emergency stations close at hand or to go, if practicable, to the hospitals which are well equipped and well staffed.

SENATOR WAGNER: Doctor, your survey that your Association made does show the absolute need of hospitals in certain areas of the country, isn't that so?

DR. CUTTER: This survey covered only the state of Mississippi. With respect to the white population it showed that hospital facilities were adequate but it also showed a lack of beds available to the Negro population.

SENATOR WAGNER: You would take into consideration of course the factors that you indicated a moment ago. You would take them into consideration if you were a member of the council?

DR. CUTTER: Yes. I should like to call the attention of the committee to this map. Dr. West mentioned that persons often traveled a longer distance than seemed to be necessary to get to a hospital. This map was taken by getting each hospital to give us a record of the homes from which patients came, provided they lived outside the metropolitan community where they would naturally go to the hospital. And you will see, by following these lines, that many people traveled right by one or two or sometimes three hospitals to get to the hospital they chose to go to, presumably because they could find a type of service in that institution which they couldn't find in the institutions nearer by. But it does show that in a level state like Mississippi, with good roads, people don't object to traveling considerably where they have a reason for it.

AFTERNOON SESSION

Howard A. Dawson, Director of Rural Service, National Education Association

MR. DAWSON: I am Howard A. Dawson, the director of rural service for the National Education Association of the United States. We consider that the health of the school children is a matter of primary importance and that school is closely related to all matters of health and especially the public health.

The National Education Association has a plank in its platform which I should like to read into the record:

> Every child, regardless of race, belief, economic status, residence or physical handicap should have the opportunity for fullest development in mental, moral and physical health and the attitudes, knowledge and skills that are essential for individual happiness and effective citizenship in a democracy.

The American Association of School Administrators, in its convention at St. Louis about two weeks ago, had the following statement to make:

> The American Association of School Administrators believes that the greatest wealth of our nation, both immediate and potential, is its people; that human values are basic and that government exists primarily to insure the greatest possible protection and cultivation of its human wealth.
>
> In the face of the tremendous gains that have been made in the development of the material resources of our nation and the increasing emphasis on the conservation of our national wealth, this association urges the American people to recognize that their primary responsibility is toward humanity and to work for the conservation and cultivation of these human resources at least with the same degree of intelligence, zeal and devotion as is at present being demonstrated in the development and preservation of the material resources of our nation.

We know that there are many children in the United States living in communities that do not and never did have adequate health service, and we are thoroughly convinced they are not going to, except through local, state and federal financial assistance. That does not necessarily mean that we are advocating what is sometimes known as "state medicine." It does seem to us that the least the federal government could do would be at this time to spend a mere pittance of ten million dollars to get hospitals in these areas where children are neglected. I should also like to point out that these very areas where there are the least medical and educational services are the areas from which the surplus population of the United States is coming. This particular bill has not been before our association and has not been approved, but I will say that it is in conformity with our platform and program.

(To be continued)

MEDICAL LEGISLATION

MEDICAL BILLS IN CONGRESS

Changes in Status.—A subcommittee of the Senate Committee on Education and Labor held a public hearing, March 18 and 19, on S. 3230, Senator Wagner's bill to promote the national health and welfare through appropriation of funds for the construction of hospitals. Senator McNary, Oregon, has served notice that he intends to offer amendments to S. 3230 to permit the funds to be made available by the bill to be used "for the enlargement of publicly maintained hospitals" as well as for the construction of new hospitals. S. 1460 has been reported to the Senate, with amendments, providing for uniform reciprocal hospitalization in any Army or Navy hospital for retired personnel of the Army, Navy, Marine Corps and Coast Guard. S. 3633 has been reported to the Senate, providing that a candidate for appointment in the Dental Corps of the Army, to be eligible, must be a graduate of a recognized dental college, have been engaged in the practice of his profession for at least two years subsequent to graduation, or must have, after such graduation, satisfactorily completed a dental internship of not less than one year in a hospital or dispensary. H. R. 1008 has been reported to the House, with amendment, conferring on certain persons who served in a civilian capacity under the jurisdiction of the Quartermaster General during the War with Spain, the Philippine Insurrection or the China Relief Expedition the benefits of hospitalization and the privileges of soldiers' homes.

Bills Introduced.—S. 3654, introduced by Senator Sheppard, Texas, and H. R. 9091, introduced by Representative May, Kentucky, propose to amend the National Defense Act so as to provide that hereafter the authorized maximum number of enlisted men of the Medical Department of the Regular Army shall be in each fiscal year such number as shall equal 7 per cent of the average annual pay strength of the active list of the Regular Army and the average strength of all other military personnel on extended active duty with the Regular Army during such fiscal year. S. 3660, introduced by Senator Capper, Kansas, proposes a federal appropriation of $50,000,000 for the fiscal year ending June 30, 1941, and thereafter such sums as may be necessary, to induce the states to embark on a program of compulsory and voluntary health insurance. H. R. 9017, introduced by Representative Edelstein, New York, provides that the officers and enlisted personnel of the United States Reserves requiring hospitalization and medical care shall be entitled to enter any army or navy hospital on their own personal request, under the same conditions as are now or which may hereafter be fixed for the active service. H. R. 9040, introduced by Representative Rankin, Mississippi, proposes to provide domiciliary care and medical and hospital treatment to persons recognized as veterans of the World War under public laws in effect on March 19, 1933. H. R. 9052, introduced by Representative May, Kentucky, proposes to amend the National Defense Act so as to eliminate from it the requirement that a candidate for appointment in the Dental Corps of the Army must have practiced two years after graduation. H. R. 9154, introduced by Representative Fulmer, South Carolina, proposes to promote the national health and welfare through appropriation of funds for the construction of hospitals. This bill is a companion bill to Senator Wagner's hospital construction bill, S. 3230. H. R. 9097 and H. R. 9098, introduced by Representative Mills, Louisiana, propose to provide hospital allowances to dependents of indigent hospitalized veterans.

STATE MEDICAL LEGISLATION

Mississippi

Bills Introduced.—S. 322 proposes to authorize the boards of supervisors of the several counties to levy a special one mill tax for the care, treatment and hospitalization of indigent persons suffering from tuberculosis. H. 725 proposes to appropriate $1,205,892.60 for the fiscal years 1940 and 1941 to be used to provide treatment and hospitalization for the indigent sick. H. 723 proposes to turn over the present state charity hospitals to the counties in which they are located for operation as county charity hospitals, reserving to the state the right to resume control of possession at any time that it deems necessary on the payment by the state of the reasonable value of all equipment and supplies installed by the counties in the hospitals during their operation of them. H. 726 proposes to authorize the board of health to procure and distribute free of charge the proper serum or vaccine for vaccination for hydrophobia.

New York

Bill Introduced.—S. 1992 proposes to authorize superintendents of schools, under regulations to be issued by the appropriate board of education, to require any employee, or applicant for employment, of the board of education to submit to a medical examination.

Rhode Island

Bill Introduced.—H. 1033 proposes to enact a uniform food, drug and cosmetic act regulating the manufacture, sale, distribution and advertising of drugs, cosmetics, foods and therapeutic devices.

OFFICIAL NOTES

ADDRESSES BY OFFICIAL STAFF

DR. W. W. BAUER:

April 9—Sexton School Parent Teacher Association, Chicago.
April 17—New England Health Institute, Hartford, Conn.
April 22—Riverside Junior Women's Club, Riverside, Ill.
April 25—American Association of Health, Physical Education and Recreation, Chicago.
April 30—Iowa Public Health Association, Des Moines, Iowa.

DR. MORRIS FISHBEIN:

April 8—City Club, Sherman Hotel, Chicago.
April 11—Rotary and Service Clubs, Kankakee, Ill.
April 14—Phi Delta Epsilon, Chicago.
April 17—Jackson County Health Forum, Kansas City, Mo.
April 19—Kentucky Education Association, Louisville, Ky.
April 25—Medical Association of Georgia, Savannah, Ga.

DR. R. G. LELAND:

April 2- 4—Stephens College, Institute for Consumer Education, Columbia, Mo.
April 18—St. Clair County Medical Society Auxiliary Laity Day Tea, East St. Louis, Ill.

MR. A. M. SIMONS:

April 2—North Shore Branch of Chicago Medical Society, Chicago.

DR. PAUL A. TESCHNER:

April 10—Vocational and Educational Conference, De Kalb, Ill.
April 15—Woman's Club, Chilton, Wis.
April 22—Nebraska Tuberculosis Association, Omaha.
April 26—High School, Aurora, Ill.

DR. NATHAN B. VAN ETTEN:

April 9—Tennessee Medical Association, Chattanooga.
April 21—Minnesota State Medical Society, Rochester, Minn.
April 24—Nebraska State Medical Society, Lincoln.
April 29-30—Missouri State Medical Society, Joplin.

DR. PAUL C. BARTON:

April 5—Central High School, Superior, Wis.
April 5—East High School, Superior, Wis.
April 5—Women's Club, Superior, Wis.

WOMAN'S AUXILIARY

Arkansas

Dr. Thomas P. Foltz, president of the Sebastian County Medical Society, discussed socialized medicine at a recent meeting of the woman's auxiliary in Fort Smith. The auxiliary has given subscriptions of *Hygeia* to the Girls' Club, to the Rosalie Tilles Children's Association, to the Carnegie Library and to several rural schools in the Fort Smith area. It has made donations also to the state loan fund for medical students.

Mrs. C. E. Kitchens, president of the auxiliary to the Arkansas Medical Society, spoke at the November meeting of the auxiliary to the Union County Medical Society on the aims and purposes of the medical auxiliary and its program for the year.

The auxiliary to the Southeast Arkansas Medical Society met in Dermott November 20, when the physicians entertained forty-six members of the medical society and the auxiliary at dinner in the Methodist Church. A fund was given for purchasing fruit for the children's homes at Monticello.

The auxiliary to the Washington County Medical Society is preparing linens and garments for patients at the hospital in the county.

Florida

Mrs. L. C. Ingram, president of the auxiliary to the Florida Medical Association, addressed the third annual meeting of the North Central Medical District in Ocala recently. Mrs. Julian N. Tolar, Sanford, was elected president of a newly formed auxiliary to the South Central medical district.

The auxiliary to the Polk County Medical Society met in Winter Haven November 11. Articles from the *Bulletin* of the Woman's Auxiliary to the American Medical Association and from *Hygeia* were read and attention was called to the American Medical Association's broadcast over the National Broadcasting Company on "Medicine in the News."

The auxiliary to the Duval County Medical Society regularly entertains the doctors with dinner preceding meetings. At a recent meeting of the auxiliary in Jacksonville, Dr. Edward Jelks spoke on state medicine.

Indiana

Sixty members of the auxiliary to the Allen County Medical Society were entertained recently at the Irene Byron Tuberculosis Sanitarium near Fort Wayne. In October the auxiliary was hostess at the annual meeting of the auxiliary to the Indiana State Medical Association.

An auxiliary to the Morgan County Medical Society was organized at Martinsville, December 13. Mrs. Patrick Murphy of Morgantown was elected president. Speakers were Mrs. William E. Tinney, president of the auxiliary to the Indiana State Medical Association, and Mrs. Fred Wishard, its organization chairman. An auxiliary to the Carroll County Medical Society was organized in Delphi, December 12. Mrs. Charles Crampton was elected president.

Seventy members attended the meeting of the auxilary to the Marion County Medical Society in Indianapolis, January 8. Mrs. Bjorn Winger spoke on "The Norwegians at Home," and Mrs. William E. Tinney, president of the auxiliary to the Indiana State Medical Association, discussed the policies of the auxiliary.

Iowa

The Seventh Annual Health Essay Contest, sponsored by the auxiliary to the Iowa State Medical Society and the speakers bureau of the society, for high school students in Iowa opened January 10 and will close March 15. The subject of the essays is "The Road to Health." The judges will be members of the state department of public instruction, the state department of health, the Iowa State Medical Society and the auxiliary to the Iowa State Medical Society.

Michigan

The auxiliary to the Bay County Medical Society was entertained recently by the auxiliary to the Saginaw County Medical Society in Saginaw.

The auxiliary to the Calhoun County Medical Society met in Battle Creek November 7. The auxiliary has contributed $100 to each of the following: the Hannah Swift Memorial for the nurses of Community Hospital, the fund for crippled children of Calhoun County and the Christmas activities of the Michigan Children's Aid Society. The auxiliary contributed $10 to the Nurses' Training School of each hospital at Christmas time.

The auxiliary to the Eaton County Medical Society held its November meeting in Charlotte. A project of the auxiliary is to raise funds for the Home Delivery Service of the Eaton County Health Department.

The auxiliary to the Genesee County Medical Society met in Flint November 29 and contributed $93 to the Red Cross and also sent food and clothing to needy families, both at Thanksgiving and at Christmas. Members of the auxiliary to the Jackson County Medical Society are cooperating in the Red Cross emergency call by knitting garments for Polish refugees.

New Hampshire

The auxiliary to the Rockingham County Medical Society met at the Portsmouth Hospital, Portsmouth, recently. Mrs. Emery M. Fitch, president of the auxiliary to the New Hampshire Medical Society, was guest speaker.

The auxiliary to the Belknap County Medical Society met with the county medical society at Campton November 14. Following dinner at the Baptist Church, the auxiliary assembled at the home of Mrs. Webb Little, who gave a talk on old New England glass. The chief project of the auxiliary is giving prizes to student nurses at the Laconia Hospital in Laconia.

The auxiliary to the Hillsboro County Medical Society met in Milford November 14. Mrs. Robert Flanders discussed *Hygeia* and Mrs. Harry Morse, public relations.

The Benevolence Fund of the medical society is the chief project of the ten auxiliaries in New Hampshire. The officers of the state auxiliary have requested that the members read articles especially pertaining to medical legislation.

New York

Presidents elected at recent annual meetings of county auxiliaries in New York are as follows: Mrs. G. C. Sincerbeaux, Cayuga; Mrs. W. D. Collins, Columbia; Mrs. E. M. Neptune, Onondaga, and Mrs. F. W. Seward, Orange.

South Dakota

The auxiliary to the Watertown District Medical Society met in Watertown December 15. Mrs. Finn Koren, Watertown, was elected president.

West Virginia

The auxiliary to the Cabell County Medical Society met in Huntington November 13. Dr. Arthur E. McClue, state health commissioner, spoke on "The Social Security Act and Its Relation to the West Virginia Worker"; Dr. Raymond Sloan discussed "City Clinics."

The auxiliary to the Fayette County Medical Society met in Montgomery recently. Mrs. H. F. Troutman discussed "Socialized Medicine."

Dr. W. P. Hamilton, health officer of Logan County, spoke on "Periodic Health Examinations" before the auxiliary to the Logan County Medical Society, Logan, December 5.

Mrs. V. E. Holcombe, president, auxiliary to the West Virginia State Medical Association, addressed the auxiliary to the Marion County Medical Society at the October meeting in Fairmont. The auxiliary celebrated its tenth anniversary with a dinner in Fairmont November 28.

Miss Esther Finley, R.N., spoke on "What the Red Cross Means to Our Community" at a meeting of the auxiliary to the Parkersburg Academy of Medicine December 12.

The auxiliary to the Harrison County Medical Society met in Clarksburg December 7. Adjutant Morris, of the Salvation Army, and Mrs. Walraven, of Charleston, discussed the needs of "The Crippled Child"; Mrs. Corinne Bunn spoke on "Maternal Health."

Medical News

(PHYSICIANS WILL CONFER A FAVOR BY SENDING FOR THIS DEPARTMENT ITEMS OF NEWS OF MORE OR LESS GENERAL INTEREST: SUCH AS RELATE TO SOCIETY ACTIVITIES, NEW HOSPITALS, EDUCATION AND PUBLIC HEALTH.)

ARIZONA

Hospital Meeting.—The Arizona Hospital Association held its annual meeting at the Adams Hotel, Phoenix, February 2-3. Dr. Clarence G. Salsbury, Ganado, gave the presidential address on "The Arizona Hospital Association, Its Scope and Purpose." Other speakers included:

Paul Elliott, D.D., Group Hospitalization, Its Plan and How It Works.
Mr. J. O. Sexson, superintendent, Good Samaritan Hospital, Phoenix, The Development and Management of Hospital Personnel.
Dr. Roland A. Davison, medical director, The Desert Sanatorium and Institute of Research, Tucson, The Importance to Hospitals of Good Public Relations Education.
Dr. Charles A. Thomas, medical superintendent, Southern Pacific Sanatorium, Tucson, Responsibility of the Hospital for Health Education and First Aid Programs.

COLORADO

Society News.—The Fremont County Medical Society was addressed recently by Dr. Irvin I. Schatz, Pueblo, on encephalitis.——Dr. Karl F. Arndt, Denver, addressed the Otero County Medical Society at La Junta, March 21, on cardiac insufficiency. —— The Pueblo County Medical Society was addressed, March 19, by Dr. Merrill W. Michels, Pueblo, on "Osteomyelitis of Skull and Sinuses." Dr. John B. Farley, Pueblo, discussed "Water Balance in Surgery" before the society, March 5. —— Dr. Edward R. Mugrage, Denver, addressed the Northeast Colorado Medical Society, March 14, on "The Leukemias" and Dr. Kenneth C. Sawyer, Denver, "Surgical Lesions of the Stomach and Duodenum."——A symposium on venereal disease was presented before the Medical Society of the City and County of Denver, April 2, by Drs. Charles Smith, Osgoode S. Philpott and Henry A. Buchtel. The society was addressed, March 5, by Drs. Wilfred S. Dennis on "Organic Lesions of the Colon" and Solomon S. Kauvar, "Functional Disorders of the Colon."

FLORIDA

Changes in Health Officers.—Dr. Robert J. Lamb, formerly of Jacksonville, has been appointed health officer of Franklin and Gulf counties, succeeding Dr. Derric C. Parmenter. His headquarters will be in Apalachicola. Dr. Clayton A. Adams Jr., formerly of Trenton, has been appointed health director of Jackson County, with headquarters in Marianna.

Society News. — Bradley M. Patten, Ph.D., Ann Arbor, Mich., presented a micro-moving picture of living embryos showing the development of the circulatory system before the Dade County Medical Association in Miami, February 6.—— Dr. Francis A. Copp discussed "Plastic Surgery" before the Duval County Medical Society in Jacksonville, March 19, and Dr. Lucien Y. Dyrenforth conducted a clinical pathologic conference.

GEORGIA

State Medical Meeting at Savannah.—The annual meeting of the Medical Association of Georgia will be held at the Hotel DeSota, Savannah, April 23-26, under the presidency of Dr. William H. Myers, Savannah. The program includes the following speakers from out of the state:

Dr. Kenneth M. Lynch, Charleston, S. C., Progress in Knowledge and Control of Cancer.
Dr. Lloyd Noland, Birmingham, Ala., The Function of the Industrial Physician.
Dr. Frank H. Lahey, Boston, Thyroid Disease.

Dr. Rollin T. Woodyatt, Chicago, will present the Abner Wellborn Calhoun Lecture Wednesday on "Newer Phases of the Diabetic Problem" and Dr. Myers the presidential address Thursday on "Medicine: Yesterday and Tomorrow." The annual banquet with Dr. Julian K. Quattlebaum, Savannah, as toastmaster, will be addressed by Dr. Morris Fishbein, Chicago, on "American Medicine and the National Government." A symposium on the problems of medical care in Georgia will be conducted by Drs. Cyrus W. Strickler, Thomas F. Abercrombie, Charles W. Roberts, Alfred A. Weinstein, James E. Paullin, all of Atlanta; Benjamin H. Minchew, Waycross; Alfonso J. Mooney, Statesboro; Enoch Callaway, LaGrange, and Clarence L. Ayers, Toccoa. A symposium on obstetrics will be presented by Drs. James R. McCord, Atlanta; H. F. Sharpley Jr., Savannah; Edward Carson Demmond, Savannah; Richard Torpin, Augusta; Rudolph A. Bartholomew, Atlanta, and Otis R. Thompson, Macon. The woman's auxiliary will meet April 23-25.

IDAHO

Society News. — The Pocatello Medical Society was addressed February 1 by L. F. Bracken, manager, State Insurance Fund of Idaho, on the state industrial insurance program and by Dr. William F. Howard, "Hormones and Vitamins."

New State Health Director.—Dr. Ernest L. Berry, Buhl, has been appointed state director of health, according to *Northwest Medicine*. He succeeds Dr. Howard L. McMartin, Boise, who has been acting director. Dr. Berry graduated at Northwestern University Medical School, Chicago, in 1918.

IOWA

Dr. Fay Donates Library. — Dr. Oliver J. Fay, Des Moines, has given his medical library, consisting of more than 1,500 volumes, to Iowa Methodist Hospital. A library board has been established, composed of Drs. Joseph B. Priestley, Thomas A. Burcham, Christian B. Luginbuhl, James E. Kahler and Mr. Robert A. Nettleton, the last two being ex officio members. They are the hospital pathologist and superintendent respectively. Mrs. S. D. McFadden has been librarian on a full time basis. Dr. Walter L. Bierring, state health commissioner, has added 225 volumes to the collection and Dr. Joseph A. Goodrich fifty-five volumes.

KANSAS

Personal.—Dr. David D. Holaday, formerly of Osage City, has been appointed full time health officer of Marion County. ——Dr. Joseph W. Spearing, formerly of Cimarron, has been appointed health officer of Cherokee County with offices in Columbus.

Society News.—The Sedgwick County Medical Society was addressed in Wichita, February 6, by Drs. Vern L. Pauley on "Problems in Thyroid Surgery" and Theodore W. Weaver and Wilbur G. Gillett, "Lesions of the Visual Pathways." All are of Wichita.——The Lyon County Medical Society was addressed in Emporia, February 6, by Drs. James H. Danglade, Kansas City, Mo., on "Use and Abuse of Certain Cardiac Drugs," and Ferdinand C. Helwig, Kansas City, "Certain Medicolegal Aspects of Acute Alcoholic Intoxication."——The Shawnee County Medical Society was addressed, March 4, by Drs. Clyde B. Trees on "Use of Carrel-Dakin Solution in the Treatment of Compound Fractures"; Leo A. Smith, "Perianal and Perirectal Infections," and George F. Helwig, "Blood Transfusions." All are of Topeka.

MASSACHUSETTS

Dr. Bunker Named Dean at Institute of Technology.—John W. M. Bunker, Ph.D., director of the research laboratories of biology and professor of biochemistry and physiology, Massachusetts Institute of Technology, Cambridge, has been appointed dean of the graduate school, it is announced. As director of the biologic division of Digestive Ferments Company, Detroit, 1915-1921, he is credited with establishing the first source of supply of dehydrated bacteriologic culture mediums now used in bacteriologic laboratories throughout the world.

Dr. McKhann Goes to Michigan.—Dr. Charles Fremont McKhann, associate professor of pediatrics and communicable diseases, Harvard Medical School and the Harvard School of Public Health, Boston, has been appointed professor and head of the department of pediatrics and communicable diseases at the University of Michigan Medical School, Ann Arbor. He succeeds the late Dr. David Murray Cowie. Dr. McKhann graduated at the University of Cincinnati College of Medicine, Cincinnati, in 1923. He became associated with Harvard in 1929 and from 1935 to 1936 served as visiting professor of pediatrics at Peiping Union Medical College, Peiping, China. He once served as president of the Society of Pediatrics Research.

Society News.—Dr. Michael J. Kranichuck, South Hadley Falls, retiring president, addressed the Eastern Hampden Medical Association at its sixtieth anniversary meeting, February 29, in Springfield on "Rocky Mountain Spotted Fever." Dr. Richard E. Dickson, Holyoke, the oldest living member

of the society, delivered a paper tracing the history of the association from its beginning in the home of Dr. R. E. Ballard. Monson, with two members, up to the present time. The by-laws provided that the meetings should be held monthly "on the Thursday preceding the full of the moon." The moonlight was needed for the homeward drive. This custom has been maintained. —— Dr. John P. Hubbard, Boston, among others, addressed the New England Heart Association, February 26, on "Paroxysmal Tachycardia and Its Treatment in Young Infants."——At a meeting of the Worcester District Medical Society, March 13, the speakers were Drs. Roger W. Robinson on "Sulfapyridine" and Robert M. Zollinger, Boston, "Acute Cholecystitis."

MICHIGAN

Hospital News.—The University Hospital Clinical Society, Ann Arbor, which ceased to function in 1925, was to be reorganized at a meeting, February 7. Its purpose is to stimulate a closer relationship between the various clinical staffs of the hospital and encourage the younger staff members in the preparation and presentation of clinical and technical material.

Industrial Meeting.—The Michigan Association of Industrial Physicians and Surgeons will hold its annual meeting in Grand Rapids, April 17. The speakers will include:

Dr. Elston L. Belknap, Milwaukee, Silicosis—Wisconsin Plan.
Dr. Frederick W. Slobe, Chicago, Injection Treatment of Hernia.
Dr. Chester B. McVay, Ann Arbor, Operative Treatment of Hernia.
Dr. Kenneth E. Markuson, Lansing, Integration of Industrial Medicine with Hygiene.
Dr. Elisha S. Gurdjian, Detroit, Nerve Injuries.

At the annual dinner, Dr. Paul B. Magnuson, Chicago, will deliver an address on "Low Back Pain."

Society News.—Dr. Julius H. Hess, Chicago, addressed a joint meeting of the Wayne County Medical Society and the Detroit Pediatric Society, March 11, on "Bronchiectasis in Childhood."——Dr. Alan C. Woods, Baltimore, addressed the Detroit Ophthalmological Society, March 21, on "Ocular Tuberculosis."——The Ingham County Medical Society was addressed in Lansing, February 20, by Dr. Joseph A. Johnston, Detroit, on "Childhood Tuberculosis." —— The Michigan Society of Neurology and Psychiatry was addressed in Ann Arbor, March 14, by Drs. Dayton D. Salon on "Spontaneous Subarachnoid Hemorrhage"; Ralph M. Patterson, "Some Considerations of Forensic Psychiatry in Michigan," and Edgar A. Kahn, "Use of a Contrast Medium (Thorotrast) in the Surgical Approach to Cystic Lesions of the Brain."

Physicians Honored.—Two physicians were honored at a meeting of the Academy of Surgery of Detroit, February 8, one posthumously. The meeting was a memorial to Dr. Frank B. Walker, who died in 1927, and included the unveiling of a portrait of him painted by William Glason. Dr. Walker graduated at the Detroit College of Medicine and Surgery and was associated with it for thirty-one years, serving, among other things, as registrar and professor of operative surgery. At this meeting Dr. Don W. McLean was honored for having received recognition at the session of the American Academy of Surgery in October 1939 in Philadelphia, where he was presented with a life membership for having prepared "the finest case history of the year." According to *Detroit Medical News*, his local confreres voted to establish Dr. McLean as a regular member of the Detroit academy and conferred a membership certificate extending to 1945.

MISSOURI

Society News. — The Missouri-Kansas Neuropsychiatric Association opened its annual meeting, February 21, in Kansas City with a round table discussion on "The Nutritional and Metabolic Factors in Neuropsychiatric Disorders." The speakers included Drs. Walter Freeman, Washington, D. C., on "The Wincing Reaction"; Herbert Randolph Unsworth, New Orleans, "Emotionalism in Disease"; George T. Harding, Columbus, Ohio, "The Treatment of Psychiatric Patients in the Private Hospital"; Abe Hauser, Houston, Texas, "Nonspecific Protein Therapy of Neurosyphilis," and, in the evening, Dr. Maurice N. Walsh, Rochester, Minn., "Low Back Pains—Sciatica and Protrusion of the Intervertebral Disk."—— Dr. Francis G. Blake, New Haven, will address the Kansas City Academy of Medicine, April 19, on "Chemotherapy in Respiratory Diseases." Dr. Allen O. Whipple, New York, addressed the academy, March 15, on "The Application of Chemistry to Certain Problems in the Preoperative and Postoperative Care of Surgical Patients."

Joint Industrial Meeting.—The Central States Society of Industrial Medicine and Surgery and the St. Louis Medical Society held a joint program on industrial medicine and surgery at the Statler Hotel, St. Louis, February 9. Included among the speakers were:

Dr. Garold V. Stryker, St. Louis, Occupational Dermatitis.
Dr. Oscar P. Hampton Jr., St. Louis, Sulfanilamide Treatment of Infections.
Dr. John Albert Key, St. Louis, Treatment of Compound Fractures.
Dr. Theodore L. Hansen, Chicago, Treatment of Burns and Their Complications.
Dr. William T. Coughlin, St. Louis, Diagnosis and Treatment of Head Injuries.
Dr. Leonard T. Furlow, St. Louis, Diagnosis and Treatment of Pathology of the Nucleus Pulposus.

A symposium on differential diagnosis of back conditions and pain was presented by Drs. Cyrus E. Burford, St. Louis; Frank D. Dickson, Kansas City, and Frederick W. Slobe, Chicago. After-dinner speakers were Drs. Clarence D. Selby, Detroit, on "The Dividends of Industrial Medicine and Surgery" and Edgar V. Allen, Rochester, Minn., "The Health of the Executive."

NEW JERSEY

Dr. Albee Honored.—Dr. Fred H. Albee of New York and Colonia was honored at a dinner dance at the Essex House, Newark, February 21, as a testimonial to his work as chairman of the Rehabilitation Commission of New Jersey for twenty years. The affair was sponsored by the state department of labor and rehabilitation. The toastmaster was William J. Egan, assistant attorney general, and the speakers were state officials. Governor Moore, unable to attend because of illness in his family, sent a message of thanks to Dr. Albee for his long gratuitous service. Dr. and Mrs. Albee received a silver service as a gift, and an oil portrait of Dr. Albee was presented to Mrs. Albee. The state rehabilitation service grew out of the organization and development of the same type of service to soldiers during the World War, when Dr. Albee was surgeon in chief of U. S. General Hospital No. 3 at Colonia.

NEW YORK

Retail Sale of Sulfanilamide Restricted. — The state board of pharmacy has promulgated a new rule requiring that sulfanilamide, sulfapyridine, their derivatives and mixtures containing them be sold only on the prescription of a physician. The prescription shall remain on file in the pharmacy and is not to be refilled if it bears indication by the physician to that effect.

White Plains Hospital Opened.—The new $1,000,000 plant of the White Plains Hospital was recently occupied. The capacity of the hospital is now 176 beds and twenty-two bassinets. Of the $900,000 construction cost, about $350,000 was contributed by Mr. Clarion B. Winslow, White Plains; $275,000 was raised on a mortgage and the remainder by public subscription. The additional cost of equipment was met by another appeal to the public.

Society News. — Dr. Henry M. Thomas Jr., Baltimore, addressed the Broome County Medical Society, Binghamton, March 12, on "Hypertension, Its Clinical Significance and Treatment."——The New York State Association of Public Health Laboratories will hold its twenty-fourth annual meeting at the University of Rochester School of Medicine and Dentistry, May 20.——Dr. Frederick A. Coller, Ann Arbor, Mich., addressed the Rochester Academy of Medicine, March 6, on "Fluid and Electrolyte Balance in the Surgical Patient." ——Dr. Wilson G. Smillie, New York, addressed the Medical Society of the County of Monroe, Rochester, March 19, on "Trends in Public Health."

New York City

Medical School News.—Dr. Russell L. Cecil, professor of internal medicine at the New York Polyclinic Medical School and Hospital, will give a special lecture at the school, April 10, on pneumonia. A special clinic for the hard of hearing has been established at the hospital under the direction of Dr. Samuel J. Kopetzky.

Meeting on Forensic Medicine.—The Medical Society of the County of Queens held a joint meeting with the Queens County Bar Association, March 26. The speakers were Robert F. Wagner Jr., state senator, on "The Doctor and the Lawyer"; Dr. Thomas A. Gonzales, chief medical examiner of New York City, "The Relation of the Medical Examiner's Office to the Public, the Law and Medicine," and Charles P. Sullivan, district attorney of Queens County, "The Role of the Physician in the Prevention of Crime."

Spring Series of Practical Lectures. — The Medical Society of the County of Kings announces its spring series of practical lectures given at the society's building in Brooklyn on Friday afternoons. Dr. Irving J. Sands spoke, March 29, on "Early Recognition and Management of Mental Disorders," and Dr. William M. Cooper, "Treatment of Varicose Veins," April 5. Future lectures will be:

Dr. Donald E. McKenna, Diagnosis and Treatment of Low Back Pain, April 12.
Dr. Harold T. Hyman, Practical Therapeutics, April 19.
Dr. Reuben Gross, Diagnosis and Therapeutic Aspects of Common Foot Disorders, April 26.

Reunion of Bellevue Class of 1890.—Fifteen members of the class of 1890 at Bellevue Hospital Medical College, now part of New York University College of Medicine, held a reunion, March 9, at the Hotel Astor to celebrate the fiftieth anniversary of their graduation. The class originally had 144 members, of whom thirty-five are still living, and most of them are still practicing, it is reported. Drs. John F. Erdmann and Henry M. Silver, who were members of the faculty of the college in 1890, were among the invited guests at the dinner. Dr. Nathan B. Van Etten, President-Elect of the American Medical Association, presided.

Society News.—Dr. Arthur M. Master addressed the Medical Society of the County of New York, March 25, on "Fluoroscopic Diagnosis of Coronary Artery Occlusion," and Dr. Edward S. Rimer discussed the society's milk commission.——Dr. Lay Martin, Baltimore, among others, addressed the New York chapter of the National Gastroenterological Association, March 18, on "Prolonged Partial Obstruction of the Small Intestine."——At a meeting of the Harlem Medical Association, March 6, the speakers were Drs. George J. Heuer on "Treatment of Gallstone Disease"; Joseph T. Travers, "Medullary and Cortical Tumors of the Adrenal Gland," and Joseph P. Hoguet, "Medical Department of the New York World's Fair 1939."

NORTH CAROLINA

Society News.—Dr. Howard H. Bradshaw, Philadelphia, addressed Forsyth County Medical Society, Winston-Salem, February 20, on bronchiectasis. —— Dr. Walter C. Alvarez, Rochester, Minn., addressed a joint meeting of the Guilford and Forsyth county medical societies in Winston-Salem, March 21, on the type of patient who will not get well in spite of treatment.

Neuropsychiatric Meeting.—The fifth annual meeting of the North Carolina Neuropsychiatric Society was held in Charlotte recently. The guest speakers were Drs. Kenneth E. Appel, Philadelphia, on "Frontiers in Psychological Medicine," and Edgar F. Fincher, Atlanta, "Clinical and Pathologic Discussion of Brain Tumors." Dr. Mark A. Griffin, Asheville, was elected president.

Personal.—Dr. John S. Anderson, formerly of Concord, at one time health officer of Craven and Cabarrus counties, has joined the staff of the state health department as consultant in public health administration in the division of county health work. —— Dr. William L. Fleming, Chapel Hill, formerly instructor in medicine and Milbank fellow in medicine at Johns Hopkins University School of Medicine, Baltimore, has been appointed professor of syphilology in the faculty of the division of public health at the University of North Carolina, according to the *North Carolina Medical Journal*.——Dr. Malcolm T. Foster, Fayetteville, has been appointed health officer of Buncombe County to succeed the late Dr. Howard L. Sumner, Asheville.

PENNSYLVANIA

Society News.—Dr. Moses Behrend, Philadelphia, addressed the Delaware County Medical Society, Chester, March 14, on "Disease of the Thorax and Its Surgical Treatment."——Dr. Murray M. Copeland, Baltimore, addressed the Cambria County Medical Society, Johnstown, March 14, on "Clinical Diagnosis and Treatment of the Common Diseases of Bones and Bone Tumors."——Dr. Joseph H. Barach, Pittsburgh, addressed the Crawford County Medical Society, Meadville, March 13, on "Present Day Treatment of Diabetes and Its Complications."

Philadelphia

Personal. — Dr. Francis R. Packard delivered the Jayne Memorial Lecture under the auspices of the Jayne Memorial Lecture Foundation and the American Philosophical Society, March 27, on "The Conquest of Surgical Pain."

Medical School News. — Temple University School of Medicine held its second annual Medical Technicians' Institute, March 11-13. The first two days were devoted to lectures and the third to demonstrations and exhibits. Dr. John A. Kolmer, professor of medicine in charge of bacteriology and immunology, was director of the institute.

Society News.—The section on otolaryngology of the College of Physicians of Philadelphia held a joint meeting with the section on otolaryngology of the New York Academy of Medicine, March 20, with Dr. Julius Lempert, New York, as the speaker on "Endaural Fenestration of the Horizontal Semicircular Canal for Otosclerosis." The following were commentators: Drs. George E. Shambaugh, Chicago; William J. Greenfield, Hackensack, N. J.; Joseph A. Sullivan, Toronto, and Edward H. Campbell, Philadelphia.——Drs. Emanuel M. Weinberger and John H. Gibbon Jr., among others, addressed the Philadelphia Neurological Society, March 22, on "Anoxia of the Central Nervous System: Physiologic and Pathologic Studies."——Dr. Arthur F. Coca, Pearl River, N. Y., addressed the Philadelphia Allergy Society, March 27, on "Highlights of the Classification and Specific Diagnosis in the Treatment of Allergic Disease."——Drs. Isidor S. Ravdin and John S. Lockwood addressed the Philadelphia Academy of Surgery, April 1, on "Use of Sulfanilamide in the Prevention of Peritonitis Following Resections of the Large Bowel" and Thomas McKean Downs, "Congenital Anomalies of the Appendix, a Familial Disease."

SOUTH CAROLINA

Changes in Health Officers. — Dr. Oscar David Garvin, Lancaster, recently health officer of Lancaster County, has been appointed health officer of Spartanburg County to succeed Dr. Hilla Sheriff, who resigned to join the staff of the state board of health.——Dr. John F. Simmons, Greenville, has been appointed health officer of Georgetown County.

District Meeting. — The Second District Medical Society held a meeting in Batesburg, February 1, with the following speakers: Drs. Virgil P. W. Sydenstricker, Augusta, Ga., on "Clinical Manifestations of the B Group Vitamin Deficiencies"; Robert P. Morehead, Wake Forest, N. C., "Appendicitis—A Clinical and Pathological Study of 5,644 Cases," and William Weston Jr., Columbia, "Experience with Acute Anterior Poliomyelitis in the Epidemic of 1939."

Society News.—The Marlboro County Medical Society held its annual meeting at Bennettsville recently with the following speakers: Drs. William Atmar Smith, Charleston, on "Differential Diagnosis of Pulmonary Tuberculosis"; William Weston Jr., Columbia, "What We Learned About Poliomyelitis in the 1939 Epidemic"; Robert A. Ross, Durham, N. C., "Management of Prolonged Labor," and Frederick E. Kredel, Charleston, "Management of Head Injuries."——Dr. Roger I. Lee, Boston, addressed the Columbia Medical Society, March 11, on hypertension. Dr. Walter E. Dandy, Baltimore, addressed the society, February 12, on "Diagnosis and Treatment of Pains and Other Disturbances Related to the Cranial Nerves."

TENNESSEE

Memorial Service for Dr. Haggard. — The Nashville Academy of Medicine held a special service, February 13, in memory of the late Dr. William D. Haggard. A memorial resolution was presented by a special committee of the academy, of which Dr. Holland M. Tigert was chairman, and the following paid tribute in addresses: Drs. Waller S. Leathers, Marvin M. Cullom, Robert O. Tucker and Henry L. Douglass. Dr. Robert R. Brown, president of the academy, presided at the meeting.

State Medical Meeting at Chattanooga.—The one hundred and seventh annual meeting of the Tennessee State Medical Association will be held in Chattanooga, April 9-11, under the presidency of Dr. William O. Baird, Henderson. At the evening meeting April 9 Dr. Baird will give his official address entitled "Why Medicine?" and Dr. Nathan B. Van Etten, New York, President-Elect of the American Medical Association, will speak on "An American Health Program." Guest speakers from outside the state will be Drs. Mynie G. Peterman, Milwaukee, on "Convulsions in Children and Their Etiology and Treatment" and Charles L. Martin, Dallas, Texas, on "New Developments in the Treatment of Cancer with Radiation." There will be two symposiums: one on traumatic surgery with the following speakers: Drs. Richard G. Waterhouse,

Knoxville; Emmett R. Hall and Duane M. Carr, Memphis; Edward Dunbar Newell, John Marsh Frere, James M. Higginbotham and Howard M. Ausherman, Chattanooga, and Rollin A. Daniel Jr., Nashville. One will be on sulfanilamide and its compounds, with the following speakers: Milton T. Bush, Ph.D., and Dr. John O. Manier, Nashville; Morton J. Tendler, Memphis, and Frederick E. Marsh, Chattanooga.

TEXAS

Annual Tuberculosis Meeting. — The thirty-first annual meeting of the Texas Tuberculosis Association will be held April 11-13 in Corpus Christi. Guest speakers will include Drs. Horton R. Casparis, Nashville, Tenn., and Donato G. Alarcon, Mexico, D. F. Among other features on the program will be a symposium on management of tuberculosis in relation to complications and concurrent diseases presented by Drs. Robert G. McCorkle and Orlando F. Gerodetti, San Antonio; McIver Furman, Corpus Christi; Elva A. Wright, Houston; Simeon H. Hulsey, Fort Worth, and Floyd N. Moore, Austin.

WEST VIRGINIA

Industrial Physicians to Meet.—Dr. Sumner L. S. Koch, Chicago, will be the guest speaker at a meeting of the West Virginia Society of Industrial Physicians and Surgeons, April 9-10, in Charleston. One meeting will be a joint session with the Kanawha Medical Society in the evening, at which Dr. Koch will discuss "Treatment of Recent Injuries."

Society News. — Dr. Thomas Grier Miller, Philadelphia, addressed the Ohio County Medical Society, Wheeling, March 8, on "Medical Aspects of Gastric and Duodenal Ulcer." Dr. William Wayne Babcock, Philadelphia, addressed the society, February 23, on "Abdominal Drainage."——Dr. Stanley P. Reimann, Philadelphia, addressed the Ohio County Medical Society, Wheeling, March 22, on "Secondary Breast Tumors."——Dr. John M. Meredith, Charlottesville, Va., addressed the Fayette County Medical Society, Montgomery, March 12, on "Diagnosis and Treatment of Acute Head Injuries."

HAWAII

Activities of Hawaiian Profession.—A recent issue of the *Bulletin* of the Hawaii Territorial Medical Association announced that incorporation of the association was under consideration. In 1925, when the Hawaiian Medical Society was reorganized as the Hawaii Territorial Medical Association, it was assumed that the society was an incorporated body, but through some error the necessary amendments to the original charter were never made. An attempt is being made to compile a complete file of the association's transactions. The association would appreciate receiving any of the following copies: 1933, 1925, 1923, 1922, 1921, 1920, 1919, 1918, 1911, 1910 and prior to 1904.

PUERTO RICO

Personal.—Comdr. James G. Dickson, Medical Corps, U. S. Navy, has been stationed in Puerto Rico as medical officer of the newly formed Tenth Naval District with headquarters in San Juan.——Lieut. Charles B. Stringfellow, Medical Corps, U. S. Navy, has been detached as medical officer of the Naval Air Station, San Juan.

Society News.—Dr. James H. Means, Boston, addressed the Puerto Rico Medical Association, February 24, on "Thyroid Problems."——Dr. Oscar G. Costa-Mandry, San Juan, president of the Puerto Rico Medical Association, addressed the annual assembly of the Graduate Nurses Association of Puerto Rico, February 8, on "Training Is the Keystone of Success."

Special Meeting.—The Puerto Rico Medical Association, the Puerto Rico Dental Association and the University of Pennsylvania Club in Puerto Rico arranged a meeting in San Juan, January 31 and February 1, with the following speakers:

Dr. Damon B. Pfeiffer, Philadelphia, Diagnosis and Treatment of Carcinoma of the Sigmoid.
Dr. Robert H. Ivy, Philadelphia, Surgery of the Face and Jaws.
Dr. George M. Piersol, Philadelphia, Coronary Artery Diseases.
Dr. John Eiman, Abington, Pa., Steps in the Development of Arterial Disease.
Dr. Frederick A. Bothe, Philadelphia, Surgical Problems in Diabetes.
Ralph Deshon, D.D.S., Philadelphia, Temporary Dissemination of Bacteria in the Blood Stream After Extraction of Teeth.

Dr. Pfeiffer and Dr. Ivy conducted operative clinics at the Bayamon District Hospital and the Presbyterian Hospital.

GENERAL

New Fellowship Established. — The committee on the chemistry of proteins of the division of chemistry and chemical technology of the National Research Council has received a grant of $3,600 from Mr. Eli Lilly, Indianapolis, for the establishment of a fellowship in protein chemistry. Isidor Fankuchen, Ph.D., has received the fellowship to continue x-ray research on proteins at the Massachusetts Institute of Technology.

Seventieth Anniversary of Journal-Lancet. — With its February issue, the *Journal-Lancet* marks its seventieth anniversary. The first medical journal in Minnesota was established in 1870 by Dr. Alexander J. Stone and continued until 1874 as the *Northwestern Medical and Surgical Journal*. In 1881 Dr. Jay Owens founded the *Northwestern Lancet* and the journal took its present title in 1911. A semimonthly journal from 1881, it reverted to the monthly status in January 1936.

Motor Vehicle Accidents in Cities.—The bureau of the census in a summary of its weekly accident reports for 1939 announces that motor vehicle deaths in 151 major cities decreased 4 per cent for the year from the 1938 record. In the first six months the decrease was 10 per cent. There were 8,009 deaths in 1939, as compared with 8,376 the previous year. Eighty-one cities showed decreases; sixty-two showed increases and eight had the same number of motor vehicle accidents in 1939 as in 1938. Six of the cities with populations of more than 500,000 showed decreases. These were: New York, with a decrease of 2.8 per cent; Los Angeles, 7.6; Cleveland, 16.6; St. Louis, 26.6; Boston, 5.6, and Pittsburgh, 8.5. The following showed increases: Chicago, 0.5 per cent; Detroit, 5.5; Baltimore, 8.8; San Francisco, 14; Milwaukee, 26.8; Buffalo, 1.2, and Washington, D. C., 7.5.

Society News.—Dr. Addison G. Brenizer, Charlotte, N. C., was chosen president-elect of the Tri-State Medical Association of the Carolinas and Virginia at the annual meeting in Richmond, February 26-27. Drs. John W. Davis Jr., Lynchburg, Va., and George R. Wilkinson, Greenville, S. C., were elected vice presidents and Dr. James M. Northington, Charlotte, was reelected secretary. Among the speakers were Drs. Temple S. Fay, Philadelphia, on the "freezing" treatment of cancer; Emil Novak, Baltimore, treatment of primary dysmenorrhea; Albert C. Broders, Rochester, Minn., cancer as it is known today; Charles F. Geschickter, Baltimore, cancerous growth in new tissues; Seale Harris, Birmingham, Ala., hyperinsulinism, and Lawrence F. Woolley, Towson, Md., morbid fears as a cause of physicopathologic changes in structure.

Mortality Trends Since 1915.—The Bureau of the Census recently issued a study of deaths and death rates in states and cities of 100,000 population or more from 1915 to 1938. Among the twenty-five states in the U. S. Registration Area in 1915, striking decreases in death rates have occurred in the District of Columbia, in which the rate fell from 16.8 to 12.7; Maine, 15.9 to 12.3; Maryland, 15.5 to 12.4; Massachusetts, 14.6 to 11.2; New Hampshire, 16.2 to 12.5; New York, 15 to 11.4; Pennsylvania, 14 to 10.5; Rhode Island, 15.5 to 12.2, and Vermont, 15 to 12. The rate in Washington in 1915 was 9.5 and in 1938 it was 11.2. Among states that entered the registration area later, the following had made notable decreases in death rates by 1938: Delaware, from 15.5 in 1919 to 12.3; North Carolina, 12.9 in 1916 to 9.6, and Tennessee, 13.4 in 1917 to 10.1. Texas, the last state to join the registration area, reported the same rate its first year (1933) as in 1938, 9.8. It is noteworthy that in all states reporting in 1918 the rates were higher than for any other year in the period. The highest appeared for Maryland, 23.6, and others in order were: District of Columbia, 22.7; Pennsylvania, 22.1; New Hampshire, 21.8; Massachusetts and Rhode Island, 20.9; New Jersey, 20.6, and Connecticut, 20.4. The lowest rate occurred in Oregon, 12.8. Next in order were Washington, with 13.3; Minnesota, 13.4, and Wisconsin, 13.6.

In the same report death rates for the cities were given for the years 1915 to 1933. Among notable decreases shown in the tables are the following: Albany, N. Y., 19.5 to 14.4; Birmingham, Ala., 17.2 to 11.4; Chattanooga, Tenn., 18.8 to 12.7; El Paso, Texas, 35.8 to 13.7; Jacksonville, Fla., 19.3 to 15; Jersey City, N. J., 15.3 to 10.8; Memphis, Tenn., 20.4 to 16.7; New Orleans, 21.2 to 16; New York, 14.6 to 10.5; Pittsburgh, 15.5 to 11; San Antonio, Texas, 19.6 to 14.3. As for the states as a whole, the cities showed the highest rates of the period surveyed in 1918. Among the highest were: El Paso, 36.3; San Antonio, 27.2; Camden, N. J., 27.1; Nashville, Tenn., 27; Chattanooga, 26.9; Pittsburgh, 26.6, and Jacksonville, 26.4.

Foreign Letters

LONDON

(From Our Regular Correspondent)

March 2, 1940.

Medical Research in the War

The annual report of the Medical Research Council points out that war conditions offer special opportunities for the acquisition of knowledge which is by no means of merely emergency interest. In the last war the council set up special committees under the chairmanship of leading men which did important work on surgical shock, chemical warfare, anaerobic bacteria and infections, air medical investigations, and anaerobic and bacillary dysentery. During the two years preceding the present war the council was entrusted by the government with a number of responsibilities. It was asked to undertake the organization and supply of certain antitoxins to be held in readiness for war purposes, particularly tetanus and gas gangrene antitoxins. It was clear that these would be required out of all proportion to normal requirements. Provision was also made for various vaccines and serums which might be required for dealing with epidemics. The council has undertaken the registration of all pathologists and medical bacteriologists and of technicians in those subjects who may be required for war service. The register will serve as a source of information when emergency posts have to be filled and at the same time help to prevent the removal of essential personnel from work which continues to be important in war time.

EMERGENCY PUBLIC HEALTH LABORATORY SERVICE

The chief task entrusted to the council is the organization of an emergency laboratory service to provide against the increased danger of epidemics resulting from evacuation schemes and other movements of population and from disorganization of normal arrangements. At the outset of the war three central and sixteen subsidiary laboratories were formed. Accommodation was found at universities and public schools.

BLOOD TRANSFUSION DEPOTS

The council organized four depots in the neighborhood of London to augment the arrangements made by the hospitals for the collection and supply of blood for transfusion. The council also assisted in coordinating the work of the hospitals and in providing them with apparatus. Advice was also given to those locally responsible for blood transfusion schemes in other parts of the country. The depots were mobilized at the beginning of the war and have since been maintained in a state of readiness. Though primarily for civilians, some have already supplied the army. New uses have been found for blood stored for transfusion for its maximum time without being required. In particular, part is being recovered for use as a prophylactic against measles, in view of the fact that the serum of most adults has power of conferring resistance against the disease.

NUTRITION IN TIME OF WAR

During the last war knowledge of nutrition was acquired which has proved of value in dealing with questions of the nation's food supply in conditions of restriction. It is vital that this knowledge be applied now if similar conditions recur. In the meantime, however, the facts have become more widely known and the importance of qualitative as well as quantitative rationing is generally realized. The special need for milk and other protective foods is an example. Scientific guidance is essential in all measures affecting the food supply of the armed forces and the population at large, if the best results are to be obtained. Great use is now made of canned foods in service rations, which raises the question of destruction of vitamins in the process. This and other points in army rations are now being investigated. So also are methods for the preservation of food during transportation and storage.

WAR PROBLEMS

The council has appointed a special committee to review the question of shock after severe wounds and operations and to organize both laboratory and clinical studies on the subject. Related to this is the question of blood transfusion, with regard to which various investigations are in progress. The great development of chemotherapy for bacterial infections gives hope for the treatment of the sepsis of war wounds. The new method will, however, need to be carefully controlled at first so that the results can be evaluated. The council has released the member of its scientific staff who has been most closely concerned with work on this subject, Colonel Colebrook, in order that he may become consulting pathologist to the British expeditionary force. He will have the cooperation at home of a special laboratory unit to investigate streptococcic infections of wounds, including civilian as well as military casualties.

The Care of War-Blinded Civilians

After the last war a well known journalist, Sir Arthur Pearson, who himself had become blind, founded St. Dunstan's Institute for Blinded Soldiers. St. Dunstan's has done great work for these men, not only providing medical care but training them in occupations and modes of recreation suitable for the blind. In no other country has such complete provision been made for blinded soldiers. War blinded civilians have now to be considered because of air raids on cities. The minister of health, Mr. Walter Elliot, has received a deputation representing the National Institute for the Blind and the Joint Blind Welfare Committee of the Associations of County Councils and Municipal Corporations, on the provision to be made for the education, training, employment and general welfare of civilians blinded as the result of war. The deputation pointed out that the whole country is covered by voluntary societies working in close cooperation with the local authorities responsible for the welfare of the blind under the Blind Persons acts, who had established a system which meets the needs of the blind more comprehensively than any similar system in the world. They came to the minister to discuss the national scheme which they had prepared for adapting the existing facilities to war requirements and, if need be, extending them to meet the needs of civilians blinded by enemy action. The minister said in reply that he wanted to secure the best possible treatment for all blind persons. He had recently arranged with St. Dunstan's under the Emergency Hospital Scheme, to undertake the hospital treatment of civilian adults. The whole cost would be borne by the government. The rehabilitation and reeducation would be undertaken by the National Institute for the Blind.

BERLIN

(From Our Regular Correspondent)

Feb. 9, 1940.

News of the Universities

Nearly all German universities have either reopened or will reopen shortly. The trimester system is now in force. The first trimester lasts from January 8 to March 21, the second from April 15 to July 31 and the third from September 2 to December 20. According to the national department of education the same achievements are expected though the training time has been reduced. The student can now complete within two years studies that formerly required three years. The training especially of physicians and engineers is being pushed during the war. The universities have been set special tasks according to the availability of scientific laboratories locally. Emphasis is on speeding up the educational process. Leisure is sacrificed. Whether the same quality of training can be achieved within a shortened time is highly problematic. The trimester was used only once in the history of German universities: after the World War, to assist students to recover lost time. After a single experiment the plan was discon-

tinued. The German medical curriculum is perhaps now shorter than that of any other country in the world.

Such revolutionary changes were not suddenly thrust forward during the war but have their basis in the altered significance attached to culture and scholarship since naziism, with its brutal subordination of all phases of German life to its partisan ideology, forced its way into power. Culture and scholarship were once Germany's highest ideals. Today they have been replaced by the political philosophy that characterizes the nazi régime. Education and scholarship are now tools to serve the political purposes of the party in power. This is publicly stated and appears even in print. Utterances like those of Rust, who heads Germany's department of education, toward the close of last year in Munich on the occasion of a university festivity are significant. He referred to "freedom of research" as a "premise" not a "privilege." All these factors indicate how thoroughly the academic assumptions that previously prevailed in Germany have been debased.

According to an official report from the office of the student leader of the reich, there are at present 1,941 foreign students in Germany representing the following countries: Bulgaria 532, Norway 142, Greece 101, with Yugoslavia, Italy, China, the Baltic states, the Scandinavian countries and the United States showing smaller numbers.

New regulations governing the writing of doctoral dissertations and examinations for the doctor's degree have just been issued by the national department of education. "In order to protect national socialist publications" in the preparation of doctoral dissertations the official examining commission of the nazis will be included to pass on dissertations that in any wise deal with the national socialist movement or party. This commission is authorized to propose changes and may even prohibit publication. Moreover, when authors of Jewish extraction are quoted in dissertations they must be so designated. In bibliographies, Jewish writers must be listed separately. The citation of Jewish writers must be reduced to the utmost; that is, citation should be made only if scientifically indispensable.

Diphtheria in 1938

An official report of the state health department on the incidence of diphtheria in Germany (exclusive of Austria) in 1938 seems to indicate its increase, as the following tabulation shows:

Year	Number of Cases	Per 10,000 Inhabitants	Per Cent of Mortality
1933	74,559	11.4	4.9
1934	113,936	17.5	4.2
1935	132,930	19.9	4.4
1936	147,029	22.0	3.8
1937	146,733	21.8	3.7
1938	149,424	22.0	3.5

These figures show an increased morbidity but a diminished mortality. In Austria, morbidity fell from 28.9 per 10,000 inhabitants in 1937 to 25.3 in 1938. About 85 per cent of the cases occurred within the age level of 0 to 15. This accounts for the greater frequency in sections with large families. The increase of diphtheria has led to intensified prophylactic measures.

Control of Barbital Derivatives

Great attention is paid in Germany to the growing use of hypnotics. According to a new order, barbital and its derivatives are now placed under strict control. Barbital derivatives, their salts and molecular combinations and the preparations made from them may be bought in drug stores only on medical prescriptions. The directions on the prescription must clearly indicate the single dose and the total dose for the day. If the diethyl, diallyl, dibrompropyldiethyl, dipropyl or phenylethyl derivatives and their salts are prescribed, the prescription may be only once filled by the patient. Prescriptions of barbital derivatives not included in this group may be renewed during the period of six months unless the prescription bears the notation "no renewal permitted." The prescription may contain also restrictions such as "may be renewed three times within two months." The regulations govern also the so-called molecular combinations of barbital and its derivatives with phenyldimethylpyrazolon or dimethylaminophenyldimethylpyrazolon and their preparations. In ready made preparations containing barbital derivatives, the wrapper, the directions and all advertisements must clearly indicate the barbital content.

OSLO

(From a Special Correspondent)

March 3, 1940.

Public Health in the North of Norway

Arctic Norway is to southern Norway what Siberia is to the rest of Russia—the abomination of desolation. Almost incredible poverty, arctic cold and darkness, and storms at sea taking a heavy toll of life make this part of the world most unattractive except from a safe distance or for a brief spell in the summer. To keep the medical services going in the North, the director of medical services sent recently qualified doctors north on the understanding that when they have served a term of a few years there they shall be rewarded with more profitable and congenial appointments as medical officers of health farther south. Now and then a young doctor finds life in the North so attractive that he remains there till old age overtakes him. Such a career is by no means desirable, least of all for the community, for such lifelong isolation almost inevitably implies scientific stagnation.

Of late years a remarkable change has come over these young doctors sent north. Instead of devoting themselves exclusively to clinical work while they gain seniority and wait for promotion south, they are now taking an active interest in public health work such as the periodic medical examination of school children and wholesale tuberculin and radiologic surveys. Occasionally reports of such surveys appear in the Journal of the Norwegian Medical Association, doubtless to the boredom of the old fashioned clinician but stimulating to the apostles of preventive medicine. Such a report has recently been made by Dr. J. Bremer and Dr. H. Lid. It is disquieting, for it shows that among several hundred school children between the ages of 8 and 15 the state of general nutrition was unsatisfactory in about 20 per cent. The same proportion suffered from underweight to a marked degree and 55 per cent were under the ideal weight. The teeth were poor in 64 per cent, and over 7 per cent suffered from rickets. Between 13 and 14 per cent were already tuberculin positive. A survey such as this should prove most valuable as a standard for comparison a generation or two hence when, let us hope, great strides will have been made. For the present we must be glad that we have at least learned what crying need there is for improving the conditions under which the present generation is growing up in the North of Norway.

Wartime Organization of the Medical Services

As preparations for war have proceeded in the medical services, it has become abundantly clear that there must be pooling of resources if the three bodies concerned are to avoid overlapping. These three bodies are (1) the medical services of the army and navy, (2) the civilian air defense service and (3) the ministry of health with its well established public health organization throughout the country. No civilian hospital is to be taken over so completely by the army or navy that civilian cases will be excluded altogether. Arrangements have already been made for converting certain buildings, hitherto used for quite other purposes, into emergency hospitals. The civilian air defense service is under the ministry

of justice and is made up of thirty administrative districts, each with a chief who is the head of the police in the same district. This body is responsible for the evacuation of civilians, fire services, repairs to waterworks, gas defense and the medical care of the injured. A committee of three is responsible for this last activity and must provide first aid for casualties in improvised hospitals, e. g. schools and the like already earmarked for this purpose.

It should be evident that the second of the three medical bodies is quite a new creation sandwiched in between the old established medical services of the fighting forces and the old established civilian services in the charge of the senior public health officer of the country. It would only be human were the directors of the already established medical services to look askance at this newcomer. But good sense has prevailed and a modus vivendi evolved for the avoidance of administrative wastage. The heads of the three bodies met in conference toward the end of the year and agreed on the creation of a central committee which officially came into being January 13. The director of medicine, Dr. K. Evang, is the chairman of this committee, whose other members are Col. O. Svenneby, head of the army medical service, Dr. H. Engelsen, head of the navy medical service, Dr. G. Johnson, representing the civilian air defense service, and Dr. A. Christensen, representing the association of hospital doctors. The only youthful figure on this committee of veterans is its chairman.

When Does a Doctor Become a Specialist?

Only a generation ago, your title to be called a specialist mainly depended on yourself, on your own opinion of yourself as a specialist. You studied a certain subject with special diligence at home and abroad, and when you settled down in practice in some town you let it be known quite informally that you were specially interested in such and such a subject. Now all this is changed and the term specialist has come to be not only hard earned but also conferred by some authority which is far more critical of your qualifications than you would be yourself. Indeed, it is hardly going too far to say that the title of specialist is hedged in by as strict official requirements as the title of doctor itself.

At present the title of specialist is conferred by the specialist committee, which consists of one of the professors in surgery, two medical superintendents of large hospitals, the medical superintendent of a small hospital, and a well known surgeon in private practice. A case, recently ventilated in the medical press, gives a good idea of the high standards required of the wouldbe specialist in surgery. The young man in question completed his medical curriculum with honors (laudabilis). He was then an intern for half a year and assistant surgeon for one year at a provincial surgical hospital of high standing. Then he served for twelve months in various capacities in the Rikshospital, which is attached to the University of Oslo. There followed sixteen months' service as assistant doctor at the naval hospital. Then he was appointed medical officer of health in the North of Norway, where he was in charge of a forty-two bed hospital. Three years later he served for two years as assistant doctor in a large provincial hospital. With all this general and surgical hospital experience, he put in his application for the title of specialist in surgery. It was refused him although more than five of his postgraduate years had been spent in hospitals the functions of which were mainly surgical.

There would assuredly be less heart burning over cases such as this if the qualifications required of a specialist were to be more strictly defined and better known than they are at present. In its decisions, the specialist committee is, to a considerable extent, influenced by the size and importance of the hospitals in which wouldbe specialists serve their apprenticeship. This tendency is quite understandable. But it also means that young wouldbe surgeons under its influence are inclined to avoid all but the largest hospitals, with the unfortunate result that the smaller hospitals get only the second best in the matter of interns and assistants.

Aid from Norwegian Doctors for Finland

By the middle of February some thirty Norwegian doctors were already at work in Finland, attached to hospital services in different parts of the country. Norwegians are keen not only on sending doctors to Finland but also on providing their salaries; and to this end Norsk Folkehjelp is appealing to the medical profession to subscribe the wherewithal for the remuneration of these thirty doctors. Another association, Foreningen Norden, is working in unison with the Norwegian Red Cross with a view to helping Finland financially in various ways. One of them is to persuade professional bodies such as the Norwegian Medical Association to agree to give the whole of one day's earnings to Finland.

AUSTRALIA

(From Our Regular Correspondent)

Feb. 28, 1940.

Nursing in the Bush

The Victorian Bush Nursing Association represents one of the most interesting public health movements of recent times. A little over thirty years ago the countess of Dudley, wife of the then governor-general of Australia, noticed that the inhabitants of the enormous country districts of Victoria had no trained nurses. When the scheme to provide them was first proposed, the medical profession objected because it feared competition, the nurses were openly hostile, and the public was afraid it would be called on to maintain another charity. The association has issued its twenty-eighth annual report. It reveals the great variety of medical institutional work which was carried on successfully in 1938-1939 in the state of Victoria, comprising local and district nursing relief and including work in hospitals as well as among isolated communities in the bush regions. The Bush Nursing Association has now extended far beyond the state of Victoria. It is essentially a cooperative concern, each center managing its own affairs. It does not publish any propaganda but gives support when a wish to form a center is expressed by the local residents and medical practitioners, all such centers being independent and self supporting. There are now fifty-one hospitals and three more are being built. There are nineteen bush nursing centers also. The central council remarks that few city dwellers realize the desire of people of independent mind to provide in their own districts modern and well equipped hospitals, owned and managed by themselves, staffed by their own doctors and by the best nurses in the state, and provided at very low rates. Hospital extensions are often found necessary after their first building by reason of the enthusiasm which results; some have had financial difficulties in carrying on, but in most cases they are all paying their way without help from outside. Had the cooperative system of nursing in the bush not been developed originally, it is doubtful whether the system could have been transferred later to the rural hospital centers. The local inhabitants regard their subscriptions as a form of insurance; one hospital closed its doors five years ago to nonsubscribers and is thoroughly satisfied with the result, so much so that a second hospital has followed this example. A few hospitals have been forced to close by shortage of medical practitioners, and if more practitioners were available the number of hospitals could be much increased. Bush nursing hospitals may not be established within 20 miles of the nearest city. A fundamental feature of these hospitals is that they take cognizance of persons before they become actually ill. The rate charged for care in hospitals depends on the number of subscribers; if there are from 100 to 150 subscribers the charge can be lowered to about £2 a week, and if there are

enough subscribers it falls to 10 shillings a week. Nonsubscribers are charged full business rates of £5 5s or more. The council's report adds that the association is not to be considered as a charity but as a cooperative movement, the public hospitals remaining available for those in necessitous circumstances, but it is open for any one to secure the admission of such cases to a bush nursing hospital by paying for them. The system is exactly what is needed in the country.

Sight Saving in Tasmania

The first Australian sight saving school was started this year in Hobart, Tasmania. It provides for the maintenance of special classes to educate pupils whose sight does not permit them to do the work of the regular grades or who attempt it only at the expense of their limited sight. Planned by the state department of education under the guidance of Mr. C. V. Brooks, director, it has the enthusiastic support of ophthalmologists. Not only will it be of inestimable benefit to the people of the island state, but some of the larger states which have resisted all the persuasive efforts of far-seeing ophthalmologists may be shamed into taking belated action. The object of the school will be to instruct the pupils with the minimum of eyestrain to teach them to conserve the vision they possess and to provide such vocational guidance and, if necessary, vocational training as will enable them to fill the most useful places in the community that their powers will permit. The small specially designed building will be an annex to one of the large state schools in Hobart. The teacher will be under the control of the head master of the larger school. The children will thus be members of a large school and at the same time will have all the facilities necessary for their tuition. Prior to the establishment of this school, children with defects in vision have been sent to schools for the blind or have been allowed to plod on in ordinary schools. In the former circumstances they no doubt received some psychologic trauma and possibly some stigmas; in the latter they were severely handicapped. Medical practitioners in all parts of Australia look forward to the time when other states will follow this excellent example.

ITALY

(From Our Regular Correspondent)

Feb. 15, 1940.

Annual Report on Public Health

Reports on the condition of public health and sanitation in Italy during 1939 were recently presented to the Department of Public Health and Sanitation. The mortality from tuberculosis for the entire population included 25,813 deaths from pulmonary tuberculosis and 9,134 deaths from extrapulmonary tuberculosis. Laws by which antituberculosis centers were established in the provinces of Italy were made in 1927. The rate of mortality dropped from 147 deaths per hundred thousand of population in 1927 to 80 in 1939, a 46 per cent reduction in the mortality rate from tuberculosis in 1939 in comparison to 1927. The Ministerial Offices of Public Health gave money and support to the provincial organization for the establishment of antituberculosis dispensaries, which number 460. Some dispensaries are evolving into polyclinics with special departments for the early diagnosis of tuberculosis. The patients in dispensaries and calls at home during the year numbered 1,284,000. Medical care was given during the year to 770,000 patients who were suffering from tuberculosis. Hospital care was given to 24,456 tuberculous patients. Care in institutions for the prevention of the disease was given to 34,552 predisposed persons. There are 430 institutions for the care of pulmonary tuberculosis patients, namely climatic sanatoriums, sanatorial hospitals, tuberculosis specialized hospitals and private tuberculosis hospitals; 41,611 beds were used by 85,468 patients with a right to the bed for at least six months to each patient. Departments for the readaptation of the patients for work are already established in some sanatoriums. Antituberculosis vaccines are obligatory for infants who are living in asylums and similar centers. In children separated from their families because of tuberculous contacts, allergy is determined by means of an intradermal test made two months after the separation of the child from the infected environment. About 60,000 vaccinations have been made in children. There are several colonies of heliotherapy at the seashore and in the mountains for the sojourn of patients. Before being admitted, the patients are vaccinated against smallpox, diphtheria and typhoid.

Centers for the distribution of human milk and for the care of women during pregnancy and labor and similar centers have been established by the National Department for Welfare. The people are instructed on puericulture, and the education of midwives is intensified. The number of births in the country exceeded by 9.7 per cent that of deaths, with a total of 1,031,193 live births. Fecundity of women has diminished during the last fifteen years. Centers against sterility have been established in the cities and towns, where the natality rate is low. Diseases of the digestive tract are the most frequent cause of infant mortality. Abortion numbered 86,011 cases.

Blood Transfusion Centers

The Ministry of Internal Affairs has published through the Department of Public Health precise standards for the organization of centers for blood transfusion. Donors are already organized in various provinces. The charge for blood will differ in public and private hospitals and also for professional and occasional donors. The expense of maintaining organizations of donors will be met with funds obtained by voluntary donations and allowances from the government. Donors will be provided with record books in which their blood group will be noted. The provinces will have the proper equipment for the preservation of blood. Municipal physicians will promote direct transfusion with preserved blood and also the preservation and use of blood serum of patients who are convalescing from certain infections. In case of war, centers will be organized by the Ministries of Internal Affairs and of War, by means of which blood from civilians will be obtained and preserved for proper use. Donors will be civilians who do not meet the requirements for military service.

Marriages

IRVING E. SHAFER, Salisbury, N. C., to Miss Maggie Jane Honeycutt of Franklinton in New York, January 16.

EDWARD REYNOLDS MACLENNAN, Opp, Ala., to Miss Helen Louise O'Neal of Andalusia in February.

WILLIAM W. TRICE JR., Tampa, Fla., to Miss Rosemary Mahler of New Orleans in January.

JOHN SHORE HASH, Williamsport, Ind., to Miss Charlotte Sputh of Indianapolis, February 15.

ARTHUR D. JOHNSON, Spokane, Wash., to Miss Agnes Engebretson of Granite Falls, January 1.

JOHN L. MCCLINTOCK, Cadiz, Ohio, to Miss Myrtle Hatchell of Daytona Beach, Fla., January 17.

JOHN L. JELKS, Memphis, Tenn., to Mrs. Louise Whitmire Speegle of Denver, January 25.

WILLIAM BATTLE MALONE II to Miss Alice Allen, both of Memphis, Tenn., February 3.

LOUIS SHATTUCK BAER to Miss Evelyn Cross, both of Chicago, February 25.

FRANCIS X. MEIER, Milan, Ill., to Miss Melva Rounsaville of Moline in January.

Deaths

Joshua Marsden Van Cott ✠ Brooklyn; Long Island College Hospital, Brooklyn, 1885; assistant on the teaching staff at his alma mater, 1886-1887, curator from 1887 to 1900, lecturer from 1887 to 1889, adjunct professor from 1889 to 1891, professor of histology and pathologic anatomy from 1891 to 1899, professor of histology and bacteriology from 1899 to 1914, professor of clinical medicine from 1914 to 1917, emeritus professor of pathology and clinical medicine, consulting pathologist since 1924, and since 1938 a member of the board of trustees; president of the board of trustees of the Hoagland Laboratory; past president of the Medical Society of the County of Kings; a founder of the Associated Physicians of Long Island; fellow of the American College of Physicians; in 1913 served on the advisory committee of the board of health of New York; on the staffs of the Kings County Hospital, St. John's Hospital, Brooklyn Hospital, Wyckoff Heights Hospital, Coney Island Hospital, Methodist Episcopal Hospital, Brooklyn State Hospital and the Long Island College Hospital; aged 78; died, February 8, of cerebral hemorrhage.

Sidney D. Wilgus ✠ Rockford, Ill.; University of Buffalo School of Medicine, 1895; fellow of the American College of Physicians; member of the American Psychiatric Association and the Central Neuropsychiatric Association; past president of the Chicago Neurological Society; alienist for the department of welfare of Illinois from 1929 to 1933; chairman of the New York State Board of Alienists from 1904 to 1910; on the staff of St. Lawrence State Hospital, Ogdensburg, N. Y., 1895-1902; superintendent of the Elgin (Ill.) State Hospital, 1910-1911, and the Kankakee (Ill.) State Hospital from 1911 to 1913; on the staff of the Rockford General Hospital; founder of the Wilgus Sanitarium (Elmlawn) in 1913; on the staff of the Rockford Children's Home; veteran of the Spanish-American and World wars; aged 68; died, February 23, of coronary occlusion.

Laurence R. Taussig ✠ San Francisco; University of California Medical School, San Francisco, 1919; associate clinical professor of dermatology at his alma mater; member of the American Dermatological Association and the American Academy of Dermatology and Syphilology; at one time vice president of the American Radium Society; on the staffs of St. Luke's Hospital, University of California Hospital, Children's Hospital, Shriners' Hospital, San Francisco Hospital and the Southern Pacific Hospital; aged 46; died, February 11, of coronary thrombosis.

Charles Marshall Chilton, Memphis, Tenn.; Memphis Hospital Medical College, 1901; member of the American Urological Association; served during the World War; clinical assistant in genito-urinary diseases in 1918-1919 and instructor in genito-urinary surgery in 1919 and 1920 at the University of Tennessee College of Medicine; on the staffs of the Methodist and St. Joseph's hospitals; aged 60; died, February 10, of coronary occlusion.

Joseph E. Green, Laurel, Miss.; Tulane University of Louisiana School of Medicine, New Orleans, 1909; member and past president of the Mississippi State Medical Association; past president of the South Mississippi Medical Society; on the staffs of the Laurel General Hospital and the South Mississippi Charity Hospital; aged 54; died, February 5, of dissecting aneurysm of the aorta.

Wilbur Howard Harris, Toronto, Ont., Canada; Trinity Medical College, Toronto, 1888; past president of the Toronto Academy of Medicine; was chairman of the medical board of the Toronto Hospital for Incurables; dean of the staff of Grace Hospital from 1918 to the time of its amalgamation with the Toronto Western Hospital; aged 75; died, February 6.

Clarence Reginald Hyde ✠ Brooklyn; Long Island College Hospital, Brooklyn, 1894; formerly clinical professor of obstetrics and gynecology at his alma mater; fellow of the American College of Surgeons; consulting gynecologist to the Long Island College Hospital; member of the courtesy staff of the Brooklyn Hospital; aged 69; died, February 9.

William Watts Dunn, Beaumont, Texas; College of Physicians and Surgeons, Little Rock, 1911; member of the State Medical Association of Texas; past president of the Angelina County Medical Society; health officer; on the staffs of the Hotel Dieu Hospital and St. Therese Hospital; aged 57; died, February 5, of coronary thrombosis.

Joseph Gerhard Beykirch Jr. ✠ East St. Louis, Ill.; St. Louis University School of Medicine, 1914; past president of St. Clair County Medical Society; on the staffs of St. Mary's Hospital; aged 51; died, February 5, in the Good Samaritan Hospital, West Palm Beach, Fla., of myocarditis, nephrosclerosis and hypertension.

Joseph Clement Langan ✠ Clinton, Iowa; Rush Medical College, Chicago, 1891; past president of the Clinton County Medical Society; served during the World War as a member of the U. S. Army medical advisory board; past president and member of the staff of Mercy Hospital; aged 70; died, February 7, of coronary thrombosis.

Charles Cleveland Spangler, York, Pa.; College of Physicians and Surgeons, Baltimore, 1915; member of the Medical Society of the State of Pennsylvania; past president of the York County Medical Society; served during the World War; aged 53; on the staff of the York Hospital, where he died, January 17.

Charles Webster Tressler, Shickshinny, Pa.; University of Pennsylvania Department of Medicine, Philadelphia, 1901; for many years deputy coroner of Luzerne County; aged 62; on the staff of the Nanticoke (Pa.) State Hospital, where he died, January 6, of a skull fracture received in a fall.

Harry W. Keatley, Rock Island, Ill.; Maryland Medical College, Baltimore, 1903; served during the World War; for many years connected with the United States Public Health Service; aged 59; died, February 9, in the Mercy Hospital, Davenport, Iowa, of a gunshot wound of the head.

Michele G. Caturani, New York; Regia Università di Napoli Facoltà di Medicina e Chirurgia, Italy, 1899; member of the Medical Society of the State of New York; fellow of the American College of Surgeons; one of the founders of the Parkway Hospital; aged 66; died, February 24.

James Willard Sillaman, Bradenville, Pa.; Western Pennsylvania Medical College, Pittsburgh, 1905; member of the Medical Society of the State of Pennsylvania; served during the World War; on the staff of the Latrobe (Pa.) Hospital; aged 65; died, January 3, of carcinoma of the colon.

Frederick E. Adams, Eugene, Ore.; University of Oregon Medical School, Portland, 1911; member of the Oregon State Medical Society; served during the World War; aged 59; on the staff of the Sacred Heart Hospital, where he died, February 11, of carcinoma of the stomach.

Joseph Edmond Doussan, New Orleans; Tulane University of Louisiana School of Medicine, New Orleans, 1891; formerly state senator, member of the state board of health, parish board of health and school board; formerly health officer of Lutcher, La.; aged 70; died, February 4.

Charles Archibald Ritchie, Wilmington, Del.; Hahnemann Medical College and Hospital of Philadelphia, 1895; formerly member of the state board of health; aged 67; on the staff of the Homeopathic Hospital, where he died, February 2, of carcinoma of the prostate.

Robert Bruce Wells, Edmonton, Alta., Canada; University of Toronto Faculty of Medicine, Toronto, 1894; professor emeritus of ophthalmology at the University of Alberta Faculty of Medicine; fellow of the American College of Surgeons; aged 72; died, January 30.

Edward Holtz, New York; University and Bellevue Hospital Medical College, New York, 1925; member of the Medical Society of the State of New York; aged 37; was found dead, February 21, of an incised wound of the throat caused by a broken shaving mug.

Martin Luther Koser, Nebraska City, Neb.; Jefferson Medical College of Philadelphia, 1903; served during the World War; formerly secretary of the board of health; aged 63; died, January 18, in the Veterans Administration Facility, Lincoln, of tuberculosis.

Silas Johnson Brimhall, Oakland, Calif.; University of Minnesota College of Medicine and Surgery, Minneapolis, 1902; member of the California Medical Association; at one time health officer of Elsinore; aged 66; died, January 30, of angina pectoris.

Stanford L. Warren, Durham, N. C.; Leonard Medical School, Raleigh, 1895; one of the founders, on the staff and for many years chairman of the board of trustees of the Lincoln Hospital; aged 77; died, January 31, of carcinoma of the rectum.

Jesse Clyde Graves, Lockesburg, Ark.; University of Arkansas School of Medicine, Little Rock, 1914; member of the Arkansas Medical Society; member of the school board; served during the World War; aged 59; died, February 2.

Emilie Bretthauer, Suifu, Szechwan, China; Woman's Medical College of Pennsylvania, Philadelphia, 1904; an Associate Fellow of the American Medical Association; for many years a medical missionary; aged 65; died, February 11.

James Arthur Keiger ⊕ Greensboro, N. C.; University of Virginia Department of Medicine, Charlottesville, 1916; served during the World War; aged 56; died, February 1, in St. Leo's Hospital of acute myocarditis following a cholecystotomy.

John Selden Richardson, Holly Fork, Va.; College of Physicians and Surgeons, Medical Department of Columbia College, New York, 1893; aged 70; died, February 6, in a hospital at Richmond of cerebral hemorrhage.

William Carter Mebane, Wilmington, N. C.; North Carolina Medical College, Davidson, 1905; member of the Medical Society of the State of North Carolina; aged 57; died, February 4, of cerebral embolism and chronic hepatitis.

William Addis Howard, Vincent, Ohio; Central College of Physicians and Surgeons, Indianapolis, 1895; member of the Ohio State Medical Association; aged 68; died, February 15, in the Marietta (Ohio) Memorial Hospital.

Burt Horace Hardinger ⊕ Mattoon, Ill.; Rush Medical College, Chicago, 1916; served during the World War; aged 47; on the staff of the Memorial Methodist Hospital, where he died, February 4, of diabetes mellitus.

Percy Ahrons, Tampa, Fla.; Tulane University of Louisiana School of Medicine, New Orleans, 1893; for many years connected with the United States Public Health Service; aged 67; died, January 31, of coronary sclerosis.

Peter William Holleman, Chicago; University of Michigan Department of Medicine and Surgery, Ann Arbor, 1889; on the staff of the Roseland Community Hospital; aged 79; died, February 8, of coronary occlusion.

Julius H. Weinsburg, St. Louis; Marion-Sims College of Medicine, St. Louis, 1891; member of the Missouri State Medical Association; aged 75; died, February 1, in St. Anthony's Hospital of cerebral hemorrhage.

Lewis Junius Battle, Washington, D. C.; University of Pennsylvania Department of Medicine, Philadelphia, 1893; member of the Medical Society of the District of Columbia; aged 74; was found dead, February 15.

Charles Wesley Race, Chicago; Western Reserve University Medical Department, Cleveland, 1897; aged 66; died, February 2, in St. Francis Hospital, Evanston, Ill., of arteriosclerosis and cerebral thrombosis.

George Jerome Edam, Put in Bay, Ohio; St. Louis University School of Medicine, 1934; aged 33; died, February 14, when the automobile in which he was driving plunged through the ice into 30 feet of water.

Edward Lincoln Sutton ⊕ Bellevue, Pa.; University of Maryland School of Medicine, Baltimore, 1907; on the staff of the Suburban General Hospital; aged 60; died, January 25, of influenza and pneumonia.

Lee F. Duckett, Florence, Ala.; University of Tennessee Medical Department, Nashville, 1894; member of the Medical Association of the State of Alabama; aged 72; died, February 1, of coronary occlusion.

John Franklin Anderson, Hillsboro, Ga.; College of Physicians and Surgeons, Baltimore, 1885; member of the Medical Association of Georgia; aged 79; died, Dec. 3, 1939, of cerebral hemorrhage.

Marshall McClelland Thompson, Pitcairn, Pa.; Western Pennsylvania Medical College, Pittsburgh, 1904; served during the World War; aged 60; died, January 29, of diabetes mellitus and gangrene of the foot.

Katharine Louise Eager Bowdle, East Ely, Nev.; University of Michigan Department of Medicine and Surgery, Ann Arbor, 1909; on the staff of the Steptoe Valley Hospital; aged 56; died, February 16.

John Boyle Travers, St. John, N. B., Canada; McGill University Faculty of Medicine, Montreal, Que., Canada, 1897; for many years on the staff of the Provincial Hospital; aged 75; died, January 11.

Edgar Zeh, Waterford, N. Y.; Albany (N. Y.) Medical College, 1884; member of the Medical Society of the State of New York; aged 79; died, January 10, of cerebral hemorrhage and acute nephritis.

Horace Greely Hilliard, Minong, Wis.; Beaumont Hospital Medical College, St. Louis, 1891; aged 79; died, January 27, in St. Joseph's Hospital, Superior, of mitral insufficiency and arteriosclerosis.

Benjamin Walter Greene, Macon, Ga.; University of Georgia Medical Department, Augusta, 1912; member of the Medical Association of Georgia; aged 53; died, February 5, of coronary occlusion.

George Henry Van Gaasbeek, Springfield, Mass.; Albany (N. Y.) Medical College, 1893; member of the Massachusetts Medical Society; aged 76; died, January 22, of arteriosclerosis and heart disease.

William Thomas Owen Parry, Toronto, Ont., Canada; Victoria University Medical Department, Coburg, 1885; L.R.C.P., London, 1886; M.R.C.S., England, 1887; aged 80; died, February 1.

Elizabeth N. Arnstein ⊕ New York; Columbia University College of Physicians and Surgeons, New York, 1927; on the staff of the Bellevue Hospital; aged 37; died, February 23, of acute leukemia.

Emmanuel Reuben Fast, Fostoria, Ohio; Cincinnati College of Medicine and Surgery, 1899; member of the Ohio State Medical Association; aged 71; was found dead in February of angina pectoris.

William Howard Stroup, Spencer, Ohio; University of Wooster Medical Department, Cleveland, 1885; for many years president of the town board of education; aged 88; died, February 4.

Winfred E. Conklin, Paris, Ill.; Hahnemann Medical College and Hospital, Chicago, 1902; aged 63; died, February 15, in St. Anthony's Hospital, Terre Haute, Ind., of mesenteric thrombosis.

Moody M. Harvill, Nashville, Tenn.; University of Tennessee Medical Department, Nashville, 1890; veteran of the Spanish-American War; aged 73; died, February 5, of coronary thrombosis.

Sara Geraldine Vernon, Madison, Wis.; Northwestern University Woman's Medical School, Chicago, 1897; aged 75; died, January 7, of heart disease, arteriosclerosis and bronchopneumonia.

Olav Nelson Birkland ⊕ Hibbing, Minn.; Northwestern University Medical School, Chicago, 1917; on the staff of the Rood Hospital; aged 52; died, February 2, of coronary thrombosis.

Irvin Everett Huston, Galva, Ill.; State University of Iowa College of Medicine, Iowa City; 1888; aged 80; died, February 11, at the Galesburg (Ill.) Cottage Hospital of pneumonia.

Leo Vivian Rosenthal ⊕ Mountain Dale, N. Y.; University and Bellevue Hospital Medical College, New York, 1909; served during the World War; aged 55; died, January 31, in Brooklyn.

Henry P. Fischer ⊕ Shakopee, Minn.; Detroit Colloge of Medicine, 1894; aged 69; died, January 24, in Minneapolis of subdural hemorrhage, fracture of the leg and arm and coronary sclerosis.

Verner Delaskie Ludwick, Franklin, Ind.; Miami Medical College, Cincinnati, 1889; aged 75; died, February 2, in the Indiana State Masonic Home of chronic myocarditis and nephritis.

William Lincoln Allen, Unadilla, N. Y.; Albany (N. Y.) Medical College, 1881; member of the Medical Society of the State of New York; aged 79; died, January 26, of coronary sclerosis.

William Eberle Thompson ✠ Bethel, Ohio; Cincinnati College of Medicine and Surgery, 1860; Civil War veteran; aged 104; died, February 19, of mitral insufficiency and chronic arthritis.

Nikolaos Salopoulos, Chicago; National University of Athens School of Medicine, Greece, 1890; aged 74; died, February 2, in the Presbyterian Hospital of chronic myocarditis.

Clarence Henry Hanson, Bode, Iowa; State University of Iowa College of Medicine, Iowa City, 1905; aged 57; died, January 20, in the Mercy Hospital, Fort Dodge, of myocarditis.

Morris Morton Wechsler, New York; New York Homeopathic Medical College and Flower Hospital, New York, 1929; aged 35; was found dead, February 7, in a hotel in Brooklyn.

John Webster Weed, Detroit; Michigan College of Medicine and Surgery, Detroit, 1895; member of the Michigan State Medical Society; aged 77; died, February 6, of heart disease.

Virgil Connor Totman ✠ Waterville, Maine; Medical School of Maine, Portland, 1900; on the staff of the Sisters Hospital; aged 67; died, January 6, of coronary thrombosis.

William Eaton Sims, Washington, D. C.; Columbian University Medical Department, Washington, 1899; aged 72; died, January 31, of advanced bronchiectasis and arteriosclerosis.

George Ball ✠ Brooklyn; Long Island College Hospital, Brooklyn, 1912; on the staff of the Unity Hospital; aged 53; died, February 16, at the Mount Sinai Hospital, New York.

Willis Webster Gleason, Fort Pierce, Fla.; Boston University School of Medicine, 1877; formerly a minister; aged 86; died, January 26, in the Fort Pierce Memorial Hospital.

Oscar Weiss, Santa Monica, Calif.; Rush Medical College, Chicago, 1936; aged 29; died, January 3, in the Santa Monica Hospital of injuries received in an automobile accident.

Christian Herm Eyermann, St. Louis; Homeopathic Medical College of Missouri, St. Louis, 1887; aged 83; died, February 18, of diabetes mellitus and arteriosclerosis.

Howard Addison Sharpe ✠ Verona, Wis.; Northwestern University Medical School, Chicago, 1907; aged 56; died, January 20, of hypertension and chronic myocarditis.

William Lincoln Bond, Toronto, Ont., Canada; University of Toronto Faculty of Medicine, 1890; aged 74; died, February 7, in the Morrell Memorial Hospital, Lakeland, Fla.

Christian Reese Gaul, Sinking Spring, Pa.; University of Pennsylvania Department of Medicine, Philadelphia, 1884; aged 81; died, Dec. 23, 1939, of chronic myocarditis.

Almond B. Blaydes, Atoka, Tenn.; Kentucky School of Medicine, Louisville, 1897; aged 65; died, February 14, in the Methodist Hospital, Memphis, of hypertension.

Edward Everett Meade, Denver; St. Louis College of Physicians and Surgeons, 1922; member of the Colorado State Medical Society; aged 48; died, February 7.

William Francis George, San Benito, Texas; St. Louis Medical College, 1889; University Medical College of Kansas City, Mo., 1904; aged 74; died in February.

David L. Bley, Staunton, Ill.; Jefferson Medical College of Philadelphia, 1875; member of the Illinois State Medical Society; aged 86; died, February 16.

Peter Nicholas Gatsos, Cleveland; University of Maryland School of Medicine, Baltimore, 1916; aged 57; died, February 7, of coronary thrombosis.

Leone Morden Scruby ✠ Des Moines, Iowa; University of Illinois College of Medicine, Chicago, 1905; aged 63; died, January 25, of cerebral hemorrhage.

Frank Augustus Detrick, Tallahassee, Fla.; Medico-Chirurgical College of Philadelphia, 1903; aged 65; died, February 2, of coronary thrombosis.

Hugh L. Hall, Amherst, Ohio; Western Reserve University Medical Department, Cleveland, 1884; aged 79; died, February 16, of arteriosclerosis.

Fountain Burr Ridgeway, Buckhannon, W. Va.; College of Physicians and Surgeons, Baltimore, 1891; aged 73; died in January of diabetes mellitus.

Charles Fremont Flanders ✠ Manchester, N. H.; Dartmouth Medical School, Hanover, 1881; aged 82; died, February 4, of hemiplegia.

G. Manley Ransom, New York; Long Island College Hospital, Brooklyn, 1875; aged 89; died, February 4, in Warren, R. I., of arteriosclerosis.

James Luther Koontz, Rutledge, Tenn.; Tennessee Medical College, Knoxville, 1902; aged 57; died, January 28, of combined posterolateral sclerosis.

Elwin Pasco Whitford, Belmont, Mass.; Eclectic Medical Institute, Cincinnati, 1878; aged 87; died, January 15, of coronary thrombosis.

John Frank Standeven ✠ Oakland, Iowa; John A. Creighton Medical College, Omaha, 1911; aged 54; died, January 15, of coronary thrombosis.

James Alexander Houston, Oak Park, Ill.; Jenner Medical College, Chicago, 1904; aged 64; died, February 26, of coronary thrombosis.

Fannie H. Howe, Atchison, Kan.; Ensworth Medical College, St. Joseph, Mo., 1891; aged 74; died, January 23, of bronchopneumonia.

George Walter Eastham, Fort Worth, Texas; Vanderbilt University School of Medicine, Nashville, Tenn., 1897; aged 65; died, February 12.

Shelah D. Davis, Cookeville, Tenn.; University of the South Medical Department, Sewanee, Tenn., 1900; aged 62; died suddenly, February 7.

John W. Burkett, Fort Worth, Texas; Kentucky School of Medicine, Louisville, 1887; aged 79; died, January 28, of diabetes mellitus.

John Akester, Hardinsburg, Ind.; Medical College of Indiana, Indianapolis, 1893; aged 73; died, February 14, of carcinoma of the prostate.

Julian Southworth Boyd, Simcoe, Ont., Canada; University of Toronto Faculty of Medicine, 1909; aged 51; died, February 12.

John Green Hossack, Innerkip, Ont., Canada; University of Toronto Faculty of Medicine, 1898; aged 68; died, February 25.

Theodore Lightner, Hastings, Neb.; College of Physicians and Surgeons, Baltimore, 1880; aged 83; died, January 18, of myocarditis.

John Allenson Nelms, Atlanta, Ga.; Southern Medical College, Atlanta, 1883; aged 76; died, February 1, of carcinoma of the neck.

Albert L. Trabue, Springfield, Ill.; Pulte Medical College, Cincinnati, 1881; aged 80; died, February 5, in St. John's Hospital.

Herman Drexler, Brooklyn; Baltimore University School of Medicine, 1900; aged 63; died, February 6, in Miami Beach, Fla.

Harvey Elgin Hicks, Griswold, Man., Canada; Manitoba Medical College, Winnipeg, 1897; aged 75; died, February 21.

Percival Hearn, Clinton, Ont., Canada; University of Toronto Faculty of Medicine, 1915; aged 47; died, February 12.

Thomas J. Crawford, Atlanta, Ga.; Atlanta Medical College, 1886; aged 81; died, February 12, of organic heart disease.

William H. Gibbons ✠ Croom, Md.; Baltimore Medical College, 1884; aged 77; died, February 19, of myocarditis.

William Atwood, Walla Walla, Wash.; Chicago College of Medicine and Surgery, 1917; aged 69; died, February 12.

Thomas Joseph Ney, Chicago; Chicago Medical School, 1921; aged 45; died, February 5.

Correspondence

CHEMICAL TESTS FOR ALCOHOLIC INTOXICATION

To the Editor:—The observations of Swim, McCawley and Leake (Chemical Tests for Alcoholic Intoxication, correspondence, THE JOURNAL, March 23, p. 1098) in normal healthy rabbits that have never ingested alcohol are surprising and if later confirmed will definitely prove that the test for drunkenness should not be applied to rabbits. However, I have performed numerous tests on human beings living and dead and have never found alcohol that had not been taken into the body.

The chemical test for alcohol in body fluids (Heise, H. A.: The Specificity of the Test for Alcohol in Body Fluids, *Am. J. Clin. Path.* **4**:182 [March] 1934) has been shown to be accurate for all practical purposes in tests applied to human beings. The best evidence of the specificity of the test is that the percentage of alcohol found by chemical means agrees closely with the refractometer readings calculated as for alcohol. In fact, this agreement has been so remarkably accurate that I believe the refractometer can be dispensed with. Carefully conducted experiments have revealed that lactic acid does not appear in the distillate even when sour milk is distilled by the same method that is used when body fluids are tested for alcohol. Rapid distillation involves decomposition of lactic acid, but I see no occasion for excessive heating. The following experiment clearly explains the fallacious results due to rapid distillation.

Time of Distillation	p_H	Reduction of Potassium Dichromate Interpreted as per Cent of Alcohol	Color of Distillate
2½ minutes	4.9	0.033	slightly yellow
10 minutes	5.4	0.008	colorless
30 minutes	5.4	0.008	colorless

Ten cc. of 10 per cent lactic acid mixed with the picric-tartaric solution were distilled at various rates, 10 cc. of distillate being collected in each case. It is obvious that rapid distillation forces reducing acid products into the distillate. If colorless distillates are used, indicating the absence of picric acid, there will be no important lactic acid decomposition products in the filtrate. Acetone and ether have no appreciable effect, since in this test the reduction of potassium dichromate has a time limit sufficient to give a final reading for alcohol but not for the slower oxidizable acetone or ether. Even a 1 per cent solution of acetone failed to give an appreciable reading as for alcohol, and the blood of a person under an ether anesthetic failed to show a reducing substance in the test for alcohol. It is possible that titration methods may give false readings owing to reducing substances which are completely oxidized by potassium dichromate, but the method that I use does not involve titration. The only substance that has been found to interfere has been formaldehyde, and this substance can readily be detected and removed.

The following figures are for the so-called normal alcohol in the body, quoted from C. C. Weeks (Alcohol and Human Life, London, H. K. Lewis & Co., Ltd., 1939, p. 30): Schweisheimer and the average of thirteen other observers: from 0.0029 to 0.0031 per cent; Ford, 0.00057 per cent; Harger and Goss (The So-Called Normal Alcohol of the Body, *Am. J. Physiol.* **112**:374 [June] 1935) on the other hand, found that the actual alcohol amounted to but 0.000027 per cent, since they were able to eliminate the substances produced by destructive distillation. Even the highest figure of these confirmed investigations is so low that it has no practical bearing on the medicolegal value of the tests. Weeks very aptly states that this amount "can have no bearing on the question of inebriety, and since it is found in the blood of abstainers it is merely a 'red herring' to quote such a theoretical presence of alcohol. . . ."

It is clear that all these observers have obtained results which are decidedly lower than the figures obtained by Leake and his associates.

HERMAN A. HEISE, M.D., Milwaukee.
Chairman, Committee to Study Problems of Motor Vehicle Accidents of the American Medical Association.

"ASPIRATION PNEUMONITIS, AN OBSTETRIC HAZARD"

To the Editor:—A recent contribution "Aspiration Pneumonitis, An Obstetric Hazard" by Dr. Charles C. Hall of Oakland, Calif., deserves further comment. Dr. Hall presents reports of fourteen women in labor who vomited while affected by pain relieving drugs; five of them died as a result, and the infant of one of them also was lost. The paper emphasizes the danger of the occurrence of vomiting by anesthetized patients but does not go far enough. Similar occurrences are not infrequent in patients depressed from the action of drugs other than anesthetics and from illness or accident, as well as during induction and recovery from surgical anesthesia. When pneumonitis or death from asphyxia results from inhaled vomitus, it is doubtful whether the physician in attendance should be held blameless.

Effects following injury, illness and administration of drugs for relief of pain exaggerate the hazard of aspiration of foreign matter into the respiratory tract. In addition to induction of sleep, relief of pain or anesthesia, drugs have four types of pharmacologic effects which are pertinent to the discussion.

1. *Disturbance of the Autonomic Nervous System.*—Either hypo-active or hyperactive reflex mechanisms may result. Important to the function of respiration are the reflexes of the pharynx, the larynx, the vomiting reflex, the cough reflex and ciliary activity. Although profound drug action may completely abolish all these functions, moderate dosage may hyperactivate some of them. Moderate dosage is aimed at in the relief of pain in labor and often in anesthesia for children. It is in just these two classes of patients that the stomach is likely to contain food previous to drug administration. Failure to recognize the aspiration of vomitus and failure to attribute the following "bronchopneumonia" to its true cause has been all to frequent. An anesthetist, however, can scarcely agree with Dr. Hall in absolving the administrator of drugs from responsible supervision of the physiologic welfare of his patient while the action of the drug lasts.

2. *Disturbance of Psychic Activity.*—An irrational patient or a sleepy one may fail to change his position, expectorate or otherwise protect the glottis from contamination.

3. *Loss of Muscle Tonus.*—Weak or flaccid muscles of the tongue and pharynx frequently permit normal structures about the larynx to obstruct the glottis. If foreign substances are in the neighborhood, such relaxed muscles may fail in their function of expelling vomitus from this region.

4. *Respiratory Depression.*—Decrease in respiratory exchange is a characteristic of profound dosage of nearly all pain relieving drugs. This, together with possible obstruction and contamination of the respiratory tract, tends toward a reduction in oxygen tension of the blood, which in itself is a depressant of the respiratory centers and an embarrassment to normal cell metabolism including the cells of the pulmonary alveoli. If, in addition, the anesthetist permits inhalation of oxygen deficient atmospheres, fuel is added to the flame.

From the foregoing it is obvious that safety lies in preventing obstruction and contamination of the air passages, as far as this is possible, by careful individualization of dosage. Precise dosage of drugs may be impossible. Constant supervision of the respiration of drugged patients is not impossible. By prompt and judicious application of technical remedies the instant the need for them arises, the physician ought to prevent aspiration pneumonitis. Gravity drainage of the pharynx, through the use of the lateral, prone or extreme Trendelenburg position, is often of value. Promptness is essential whatever the treatment adopted. Mechanical removal of foreign material from the pharynx with the finger and a sponge or with aspiration is often life saving. Restoration of the cough reflex by immediately decreasing the concentration of inhalation agents is sometimes effective.

If efforts at preventing tracheal and bronchial contamination fail, I believe that pneumonitis can usually be prevented by prompt and thorough toilet of the tracheobronchial tree. Such a cleansing of the main air passages (while the position of the patient is changed in all possible planes of space and while coughing is encouraged) can be performed by a bronchoscopist. Since he is seldom available instantly, it has become the practice of many anesthetists to clear the contaminated respiratory tract by means of a small semisoft or soft rubber aspirating tube passed through one of the large endotracheal airways commonly used by anesthetists to insure an unobstructed airway in anesthetized patients. Not infrequently those so treated, whose respiratory tracts have been completely contaminated, not only with vomitus but also with pus or blood, have escaped subsequent pneumonitis.

RALPH M. WATERS, M.D., Madison, Wis.

To the Editor:—I wish to commend Dr. Charles C. Hall for his article on "Aspiration Pneumonitis," which appeared in THE JOURNAL March 2. He has called attention to a very important complication which occurs all too frequently. In my experience as an anesthetist, by far the greatest number of complications from aspiration have occurred in obstetric patients. Frequently these patients have gone into labor after a full meal, but many times they have been given food while in active labor in the hospital. It cannot be urged too strongly that all women in labor be denied food and so-called sustaining drinks. I don't believe that any woman will die of starvation if deprived of food for from twelve to eighteen hours. If nourishment is imperative, dextrose may be given intravenously.

The practice of many obstetricians in demanding very light or "in and out" anesthesia is conducive to vomiting. To abolish the swallowing and vomiting reflex entirely, the depth of anesthesia must be to the first plane of surgical anesthesia.

Aspiration pneumonitis occurs infrequently with the surgical patient in my experience. The only cases that I can recall occurred in surgical emergencies in which the stomach was full. I can easily recall at least a dozen complications of this nature with obstetric patients, ranging from mild to extremely severe, fortunately with no fatalities.

The point made by the author concerning the importance of having adequate suction apparatus in readiness cannot be overemphasized. The prompt use of suction may mean the life or death of the patient.

I feel that the incidence of this complication is much greater in obstetric patients than in any other type of work requiring anesthesia. With the use of a continuous anesthesia rather than the so-called intermittent technic, one is much less apt to have vomiting. When explosive anesthetic agents are used there is also a great deal more danger of the possibility of explosion, because of the production of static with repeated application and removal of the mask in the intermittent administration.

Regarding prevention, I feel that the most important factor is to withhold food entirely from all patients in active labor and to withhold water as soon as it is apparent that delivery will follow within a few hours.

J. D. SPAID, M.D., Dayton, Ohio.

GENTIAN VIOLET FOR PINWORM INFESTATION

To the Editor:—With regard to the article in THE JOURNAL, March 9, on "Studies on Oxyuriasis: Efficiency of Gentian Violet in the Treatment of Pinworm Infestation" by Drs. Willard H. Wright and Frederick J. Brady, I should like to call attention to the use of "infusion of quassia" injected into the rectum. In a practice of more than fifty years, largely in a farming community, I never saw a failure with this treatment. To prevent reinfestation, cleanliness is of vital importance, particularly of the infected person's hands as well as of his clothing and bed clothing. Stools should be disinfected. Sleeping with an infected person should be forbidden. Raw fruits and vegetables should be thoroughly washed and cleansed, especially when used raw in salads.

J. NEWTON HUNSBERGER, M.D., Norristown, Pa.

NIRVANOL AND DILANTIN SODIUM

To the Editor:—The literature that is rapidly accumulating with regard to the use of dilantin sodium fails to note its similarity to nirvanol, which was formerly used widely in the treatment of Sydenham's chorea.

Nirvanol is phenylethylhydantoin and dilantin sodium is sodium diphenyl hydantoinate, obviously a closely related chemical compound. The toxic manifestations of nirvanol so closely resemble those of dilantin sodium that it could hardly be a coincidence. The greater incidence of toxic manifestations in using the former can be attributed largely to the fact that its efficacy was thought to depend on the production of fever and a scarlatiniform or morbilliform rash. In addition, Pilcher and Gerstenberger (*Am. J. Dis. Child.* **40**:1239 [Dec.] 1930) recorded the complications of irritation of the mucous membranes and stomatitis from phenylethylhydantoin which is probably comparable to the gingivitis occurring after sodium diphenyl hydantoinate as reported by Kimball (THE JOURNAL, April 1, 1939, p. 1244). Tisdall (*Arch. Dis. Childhood* **5**:397 [Dec.] 1930) and Marick (*Arch. Pediat.* **48**:525 [Aug.] 1931) have described the successful treatment of convulsions with phenylethylhydantoin. Eosinophilia is a common finding in intoxication from either drug.

There are probably additional similarities with which I am unfamiliar. It does seem, however, that the wealth of literature dealing with nirvanol might prove useful in interpreting the toxic manifestations of dilantin sodium.

F. KEITH BRADFORD, M.D., Houston, Texas.

BIOGRAPHY OF DR. WILLIAM H. PARK

To the Editor:—I am at work on a biography of Dr. William Hallock Park, the late director of the New York City Board of Health Laboratories. Any assistance rendered in the form of the loan of letters, anecdotes or other memorabilia will be gratefully received and due acknowledgment given. Reasonably prompt return of letters and other material is insured.

WADE W. OLIVER, M.D.
The William Hallock Park Laboratory,
Room 802, Bureau of Laboratories,
Foot of East 16th Street, New York.

Queries and Minor Notes

THE ANSWERS HERE PUBLISHED HAVE BEEN PREPARED BY COMPETENT AUTHORITIES. THEY DO NOT, HOWEVER, REPRESENT THE OPINIONS OF ANY OFFICIAL BODIES UNLESS SPECIFICALLY STATED IN THE REPLY. ANONYMOUS COMMUNICATIONS AND QUERIES ON POSTAL CARDS WILL NOT BE NOTICED. EVERY LETTER MUST CONTAIN THE WRITER'S NAME AND ADDRESS, BUT THESE WILL BE OMITTED ON REQUEST.

INCOMPATIBILITIES OF SULFANILAMIDE AND SULFAPYRIDINE

To the Editor:—**I have been using sulfanilamide in the treatment of streptococcic infections for some time. Having been informed that the saline cathartics containing compounds of sulfur such as sodium sulfate and magnesium sulfate were incompatible with sulfanilamide, I have avoided their use in such cases. I have felt all along that it was the sulfur containing drugs that were to be avoided but that milk of magnesia and sodium phosphate preparations were all right to use as cathartics. Recently, however, a fellow member of our profession who practices here also stated that he was of the opinion that these last named saline cathartics were also incompatible with sulfanilamide. Please advise me which of us is correct. I was under the impression that the sulfates, if used, might cause the formation of sulfhemoglobinemia, which was a dangerous condition for the patient. However, I have no information as to the incompatibility of magnesium, sodium or phosphorus in the compounds aforementioned with sulfanilamide. There has been so much admixture of superstition with science regarding the dangers in the use of sulfanilamide that I should like to have some of this cleared up. I should like to know also if the incompatibilities of sulfapyridine are the same as those of sulfanilamide.**

McIntosh M. Burns, M.D., Pelham, Ga.

ANSWER.—It has been stated that the use of sodium sulfate and magnesium sulfate as cathartics in the course of sulfanilamide therapy has resulted in the formation of sulfhemoglobin in the blood of certain patients. That this is a definite possibility is probably true, but its occurrence has apparently been rare. Methemoglobin on the contrary has been commonly found in the blood of patients who are receiving sulfanilamide alone. While it seems best not to use sulfur-containing saline cathartics, there is no evidence that other sulfur-containing drugs, such as quinine sulfate, morphine sulfate and codeine sulfate, are contraindicated in the course of treatment with sulfanilamide or its derivatives and there is also absolutely no reason to believe that sulfur-containing foods should be interdicted in the course of sulfanilamide therapy.

If one is faced with the need of using laxatives or cathartics in the course of sulfanilamide therapy, one can safely use magnesia magma, sodium phosphate, cascara or liquid petrolatum. As far as is known, the incompatibilities of sulfapyridine are those of sulfanilamide.

As the questioner has pointed out, there is much "admixture of superstition with science regarding the dangers in the use of sulfanilamide." While it is unfortunate that these superstitions have arisen, they can be easily cleared up if reference is made to the reports of the Council on Pharmacy and Chemistry regarding sulfanilamide (THE JOURNAL, January 27, p. 326) and sulfapyridine (p. 327). These descriptions of sulfanilamide and sulfapyridine will also appear in the New and Nonofficial Remedies for 1940.

FREEZING IN GROTESQUE POSITIONS

To the Editor:—**I have just seen photographs, so called, of "frozen Russian soldiers" in the newspapers. Is it possible medically (if I may use the term) for any one to be frozen stiff holding his head in his hand or in a standing position in the act of throwing a grenade or lying with a leg straight up in the air? Is it possible, for instance, for a whole battalion of soldiers to be frozen stiff in the position of loading machine guns as has been claimed? I feel certain that this is contrary to all physiologic and medical facts. Kindly let me know if I am right.**

J. L. Grund, M.D., Boston.

ANSWER.—If death is due solely to exposure to cold, it is difficult to conceive how a person could suddenly "be frozen stiff" in a "standing position in the act of throwing a grenade or lying with a leg straight up in the air." It is even more difficult to conceive how it would be possible for "a whole battalion of soldiers to be frozen stiff in the position of loading machine guns." It is stated that cold hastens the onset of rigor mortis, the stiffness which develops in the musculature of the body after death (Gonzales, T. A.; Vance, Morgan, and Helpern, Milton: Legal Medicine and Toxicology, New York, D. Appleton-Century Company, 1937, chapter 5, p. 53). Also exposure of a dead body to a sufficiently low temperature will cause the body to be frozen stiff. However, it is unlikely that exposure to cold could be so sudden and the cold so severe as to eliminate the drowsiness, sleep and coma that precede death from freezing. Because of that fact, persons freezing to death would naturally seek sitting, curled-up or recumbent postures (Smith A. J., and Lucke, B. H., in Legal Medicine and Toxicology by Many Specialists, ed. 2, edited by Frederick Peterson, W. S. Haines and R. W. Webster, Philadelphia, W. B. Saunders Company, 1923, vol. 1, pp. 243-244) and so their dead bodies when found would probably be in one of those positions. So far as is known, no accurate observations, if such have ever been made, have been reported relative to the sudden freezing of a living person.

Great muscular effort or exhaustion previous to death, sudden death, death due to violent disturbance of the nervous system, drowning and other forms of asphyxial death, and exposure to cold are factors predisposing to instantaneous cadaveric spasm or cadaveric rigidity (Taylor's Principles and Practice of Medical Jurisprudence, ed. 9, edited by Sydney Smith, with revision of legal aspect by W. G. H. Cook, London, J. & A. Churchill, Ltd., 1934, vol. 1, pp. 226-227), a phenomenon characterized by instantaneous stiffening of the body in the position in which it was at the moment of death without any period of muscular flaccidity which ordinarily precedes rigor mortis. For instance, an exhausted soldier on receiving a mortal wound may develop a cadaveric spasm. Under these circumstances the body may be found in a grotesque position, such as kneeling or standing upright. Usually, however, there is something which supports the body in this position. Contraction of the muscles, the result of cadaveric rigidity, may lift an extremity a short distance from the ground but not to the extent described. A man who died of a stab wound has been found in an upright position in the corner of a room, but he was supported by his elbow, which rested on a low shelf. In another instance a man has been found sitting on the edge of the bed with his elbows on his knees and his chin resting on both hands. In this case rigor was complete and the body remained in this position when it was lifted from the bed.

PEPTIC ULCER AND POSSIBLE NUTRITIONAL DEFICIENCY

To the Editor:—**A married woman aged 23 has had a variety of symptoms for the past two years. The past history reveals mild childhood diseases, scarlet fever and fall hay fever since the age of 10, with chronic sinusitis. At the age of 16, weighing 138 pounds (63 Kg.), she went on a rigid diet, losing 28 pounds (13 Kg.) within two months. Dieting continued for four years. During this time menses were absent for as long as eight months. Pregnancy did not occur until a year after marriage, and a 2 pound (900 Gm.) fetus, undeveloped, was born at term. Significant in the family history is an endocrine obesity in an older sister, who rarely has a menstrual period. Present symptoms began two years ago with an epigastric pain not related to food intake. In October 1938, after delivery, soreness of the spine and muscles developed. The appetite is variable and nausea occurs frequently. Sleeplessness occurs because of epigastric pain. The patient is easily fatigued. I first examined her in September, when her complaint was loss of menses during July and August. Pelvic examination showed normal status; the breast showed marked mastitis (chronic); red blood cells numbered 4,200,000 and white cells 8,200, with the hemoglobin content (Sahli) 88 per cent. Blood Wassermann and typhoid group tests yielded negative results and previous x-ray study showed that the spine and lungs were normal. The basal metabolic rate is normal. Gastric analysis showed 37 free and 64 total hydrochloric acid, but fluoroscopic examination of the stomach showed repeatedly a small ulcer near the pylorus and delayed emptying time. Previous treatment has consisted of injections of estrogenic substances and liquid tonics. Ulcer therapy now gives only slight relief. The diagnosis has been a nutritional deficiency. What would you suggest in the way of treatment?**

C. R. Chadbourn, M.D., Janesville, Minn.

ANSWER.—Analyzing this case from the data presented, one finds little to justify a diagnosis apart from peptic ulcer, with a possible nutritional deficiency. A weight of 138 pounds at age 16 is not uncommon, nor is it particularly abnormal unless the patient is short in stature. Irregular and atypical menstruation between the ages of 16 and 20 is rather frequently encountered. Fall hay fever with chronic sinusitis suggests the possibility of an allergic rhinitis. Delivery of a 2 pound undeveloped fetus at term could easily have been a missed abortion, the time of delivery being fortuitous. It is highly probable that an endocrine factor exists in this case, but whether it is sufficiently important to be serious seems debatable.

A diet that produces a weight loss of 28 pounds in two months would seem to be capable of producing a nutritional deficiency. The recent amenorrhea carries the same suggestion, but this suspicion is not borne out by the blood count. The existence of a peptic ulcer cannot be questioned.

It would seem logical to concentrate on controlling the ulcer. More vigorous management may be required. It may be necessary to keep the patient in bed and use mild sedation. The use of gastric mucin has been suggested in stubborn cases. The diet should be planned toward the healing of the ulcer even at

the expense of a gain in weight. The diet should be properly balanced, contain adequate mineral and be supplemented by vitamin therapy if necessary. Such a regimen might well clear up most of the symptoms.

ENLARGED HEART IN INFANCY

To the Editor:—**An 8 months old girl, apparently in the best of health and clinically, according to the examination of a consulting pediatrician, without pathologic changes, repeatedly presented and still presents on x-ray study of the chest an enormous enlargement of the heart. The past history of the patient is important: She weighed 7 pounds (3,175 Gm.) at birth and was delivered by forceps; there were no birth injuries. From the tenth day she was fed by bottle. During the first and second week of life she had severe impetigo neonatorum with normal urine but considerable loss of weight, from the fourth to the fourteenth week of life there were moderately severe pylorospasms, which could be taken care of by atropine and a thick formula; vomiting ceased soon, and the baby was gaining weight nicely. From the sixth to the sixteenth week of life there were attacks of stertorous breathing (the mother called them "choking spells") and cyanosis, which were interpreted by the consulting pediatrician as thymus symptoms and successfully (i. e., no recurrences until now) treated with roentgen rays to the thymus region. Since the baby's fourth month of life there have been no more pathologic symptoms and observations; cyanosis, vomiting and "choking spells" have been absent. The baby is still taking the thick formula and is now receiving pablum, egg yolk, scraped apple, banana, ample amounts of orange juice and oleum percomorphum, calcium lactate and occasionally, if necessary, drops of elixir of phenobarbital. The baby is gaining weight regularly, she now weighs 17½ pounds (8 Kg.), her length is 28 inches (71 cm.) and she has five teeth. The heart, which was found to be enlarged with the first roentgen treatment, is still large, though somewhat smaller in relation to the thorax than in the first months. The left border of the heart silhouette is only about one rib's width away from the chest wall, and the right border of the silhouette extends as far as the middle of the chest cavity. All the pictures were taken while the baby was quiet and not crying. The heart tones are normal, the rate about 125 at rest and the rhythm now still "embryonal" and watchlike. There is no cyanosis—even on exertion, as sitting up or crying—except possibly a trace when the child is cold, as after a bath. The calcification of the bones in the x-ray view is normal. The antepartum history is important, as the mother had severe pyelitis during the seventh and eighth months of pregnancy with threatened premature birth, as shown by actual labor pains during and after two ureteral catheterizations. The Wassermann reaction was negative. There was definite evidence that the mother had too little vitamin B before the birth of the child. Could this last fact be responsible for the enlargement of the heart? What are the significance, prognosis and management of this condition? Should one spare the baby any hard crying, inevitably spoiling her therewith? And should the baby later on prophylactically live the life of a heart cripple?**

M.D., Texas.

ANSWER.—From the observations as noted, there is marked enlargement of the heart without murmurs of evidence of decompensation, except a rapid beat. It is assumed that the abnormal x-ray shadow is the heart and not an overly large thymus or other mediastinal tumor. The following etiologic factors must be considered in this apparent hypertrophy and dilatation of the heart without murmurs in infancy:

1. So-called idiopathic congenital hypertrophy of the heart is an increase in weight of the heart associated with simple hypertrophy of the heart muscle fibers, occurring in infancy, characterized by great cardiac enlargement in the absence of any sign of myocardial inflammatory disease.

2. Congenital hypertrophy of the heart without murmurs also occurs in certain congenital defects, as an accessory ventricle or anomalies such as the anomalous origin of the coronary artery from the pulmonary artery. The electrocardiogram often yields definite diagnostic evidence in these types of case.

3. Congenital rhabdomyoma of the heart will cause marked enlargement in infancy. Occasionally "café au lait" spots on the skin are associated with these tumors of internal organs.

4. Lesions of the kidneys such as congenital cystic kidneys or nephritis will at times cause hypertrophy and dilatation of the heart in infancy, especially when associated with hypertension. High blood pressure, low specific gravity of the urine and abnormal blood chemistry, among other signs, would conclude this diagnosis.

5. Severe anemias of long standing might be a cause, but presumably this infant has no such condition.

6. A history of acute infections or toxemias which might cause a parenchymatous myocarditis were apparently not present in the infant, at least after birth, but the severe pyelitis in the mother during the seventh and eight months of pregnancy might conceivably have initiated an intra-uterine chronic inflammatory mycarditis in the infant. Such pathologic features have repeatedly been reported in the hypertrophied heart of infancy.

7. Avitaminosis, especially lack of thiamin resulting in such a condition as beriberi, has definitely resulted in enlargement of the heart in infancy. Even congenital beriberi has been reported. However, in all the reported cases the infant showed definite malnutrition and other signs of thiamin deficiency and rapidly recovered completely when an adequate dietary regimen was reestablished. This infant has always been normal nutritionally and has had a well balanced diet. Electrocardiograms are said to be fairly diagnostic of beriberi hearts.

8. There is a cardiomegalic type of von Gierke's disease (glycogen storage disease). These infants often have hypoglycemia, a fasting ketonuria, an abnormal sugar tolerance curve and frequently an enlarged liver as well as an enormous heart (excessive glycogen deposits in the myocardium). These infants are normal at birth but often have retardation of development, feeding difficulties and lowered resistance to infections. Cyanosis and evidence of cardiac failure may develop early.

Further study of the electrocardiogram, blood pressure, urine and blood chemistry and other data as outlined may aid in revealing the etiology in this particular case.

Naturally the prognosis depends somewhat on the cause, if this can be determined. Generally speaking the outlook is unfavorable; the great majority of reported cases of marked cardiac hypertrophy without murmurs in infancy have progressed to a fatal termination before the eighteenth month. The heart may remain rapid with sounds of poor quality for some time, and alarming symptoms may develop with great suddenness, especially dyspnea and cyanosis with decompensation and death. Death is at times sudden and dramatic, with sudden dyspnea and cyanosis. Consequently it probably would be wise to spare the infant any hard crying, even though this leads to inevitable "spoiling." As long as the heart remains so tremendously enlarged in proportion to the chest, the child should be protected from sudden strenuous or prolonged exertion as much as possible. How many of these patients recover is unknown.

QUINOLINES FOR TRICHOMONAS INFECTION

To the Editor:—**I have read recently of iodochloroxyquinoline being effective in Trichomonas infection. Would oxyquinoline be as safe and as effective used in a powder for vaginal insufflation as the halogenated derivative? If not, where can the halogenated product be purchased?**

M.D., Oregon.

ANSWER.—Iodochlorohydroxyquinoline is accepted for inclusion in New and Nonofficial Remedies under the name "Vioform" and is marketed by Ciba Pharmaceutical Products, Inc., Summit, N. J. It is used against Trichomonas vaginitis and amebiasis. In 1933 David, Johnstone, Reed and Leake (THE JOURNAL, May 27, 1933, p. 1658) reported that iodochlorhydroxyquinoline was the most promising of eleven halogenated oxyquinoline compounds with the possible exception of diiodohydroxyquinoline for intestinal amebiasis. They noted "an increase in toxicity with increasing halogenation of oxyquinoline and in proportion to the atomic weight of the halogen." Huffman (*Am. J. Surg.* **30**:312 [Nov.] 1935) and Zener (*Northwest Med.* **36**:7 [Jan.] 1937) attest the therapeutic efficacy of iodochlorhydroxyquinoline in vaginal trichomoniasis. Iodohydroxyquinoline (chiniofon N. N. R.) has also been proposed for treatment of vaginal trichomoniasis (Janeway, M. M.: *New York State J. Med.* **35**:528 [May 15] 1935). No recent reports have been found which refer to oxyquinoline or oxyquinoline sulfate for such therapeutic action. However, this compound has been known for a longer period than many if not most of the halogenated derivatives. From the various reports it would seem to be less toxic than the halogenated derivatives but like many preparations it may not have been given a fair trial in vaginal trichomoniasis. In the *American Journal of Obstetrics and Gynecology* (**35**:1085 [June] 1938) Hesseltine quoted various workers with respect to the different methods of treatment in common use for vaginal trichomoniasis. His clinical reports (THE JOURNAL, Sept. 4, 1937, p. 768) with silver picrate, arsenical compounds and carbohydrate therapies indicate that the physiologic restoration of the vagina to its normal state is an important factor in the treatment of vaginal trichomoniasis.

RETRAINING IN LEFT-HANDEDNESS

To the Editor:—**A girl as a child was left handed and was taught to use her right hand for writing, which she is doing now at the age of 17. She gets along well in school but is a rather slow reader. I am wondering if she should return to the use of her left hand when she writes and if this would speed up her reading ability. This question is prompted by a short article which appeared in the *Archives of Ophthalmology* for July 1938 under the heading of correspondence on page 105. If you will give me your latest information on this subject, I shall appreciate it.**

Lloyd H. Clark, M.D., Rochester, N. Y.

ANSWER.—At times retraining to left-handedness is indicated. In any individual case, however, whether there should be retraining or not will depend on a number of factors, such as the degree of dominance of left laterality (handedness, eyedness, footedness).

Also the degree to which there is disturbance in the reading would help determine the desirability of changing the long established habits existing in a 17 year old girl.

In addition to the specific situation with respect to laterality, the particular deficiencies in reading habits would require definition. The investigation of the patient's reading difficulties by one experienced in remedial reading technics is suggested.

SIXTH LUMBAR VERTEBRA—SPONDYLOLISTHESIS

To the Editor:—**What statistics are available concerning the frequency of occurrence of a sixth lumbar vertebra? I have always been of the opinion that a sixth lumbar vertebra was quite rare. Would it be possible for a physician who examines backs for an insurance company to see such a vertebra as often as once a week or several times a month? Is it possible to associate with reading a sixth lumbar vertebra by counting the twelfth dorsal as the first lumbar merely because the twelfth dorsal has no rib attachments? Is it frequent or rare to get cases of only eleven ribs? I have a case in which the x-rays show a typical lesion of the fifth lumbar vertebra sliding forward on the sacrum (spondylolisthesis). The patient has the textbook symptoms of or for spondylolisthesis: waddly gait, list to the left side, 2 cm. shortening of the left trunk (the left ilium is 2 cm. lower than the right ilium). He has severe lumbar pain and weakness. He has an accentuation of the lumbar curve, or lordosis. There are rotation and lateral upright curvature of the lumbar spine with convexity to the left. The x-ray man does not agree with these observations. He has "sprung" the idea of a sixth lumbar vertebra. The five lumbar vertebrae are typical. There is no question in this case of there being six lumbar vertebrae.**

M.D., New Jersey.

ANSWER.—There are no available statistics on the incidence of a sixth lumbar vertebra. It is a rare anomaly. It would certainly be impossible for a physician who examines backs for any insurance company to see such an anomaly as often as once a week or several times a month. He probably would not see it several times in his lifetime. The deduction that a sixth lumbar vertebra is present, based on counting the twelfth thoracic because the twelfth has no rib attached, is not an accurate method. It is rare to observe only eleven ribs. Unfortunately statistics are not available to indicate the frequency of this condition. With regard to the patient who has spondylolisthesis, it should be mentioned that if the x-rays show a displacement of the fifth lumbar either forward or backward it is a true spondylolisthesis and cannot be denied.

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SULFANILAMIDE THERAPY FOR STREPTOCOCCIC SORE THROAT

To the Editor:—**We have had a large number of streptococcic sore throats here which I have treated with sulfanilamide in the recommended dosages. In three of these cases I have had a subsequent hematuria, red blood cells after three weeks in bed still being passed in two. A slight afternoon fever up to 99 F. is present in all. There was no albumin or casts in the urine. The centrifuged specimens average about 50 red cells per high power field. Is this hematuria a complication of the throat infection or a sequela of the medication? What is the prognosis and treatment? I have thus far merely kept these patients in bed.**

Irving Auld, M.D., Clintonville, Wis.

ANSWER.—It is well known that acute hemorrhagic nephritis frequently follows the occurrence of beta hemolytic streptococcus sore throat; hence any physician seeing a large number of persons with streptococcic sore throat would expect to see a certain number developing signs of acute hemorrhagic nephritis.

Although it is stated in the query that albumin has not been found, it would seem that there might be some form of nephritic reaction following the infection in the cases under discussion and that the hematuria should not be attributed to sulfanilamide therapy.

As far as the literature is concerned there are no definite reports concerning the appearance of hematuria in the course of sulfanilamide therapy, although hematuria is fairly common in the course of sulfapyridine or sulfathiazole therapy. It seems that the prognosis in the cases under discussion should be good. The treatment should consist of rest in bed, adequate fluids, an alkaline-ash diet and removal of infected foci.

In some clinics a considerable degree of success has attended the use of sulfanilamide in the treatment of acute hemorrhagic nephritis following a known beta hemolytic streptococcus infection. However, if the patient's kidney function is decreased, care must be taken in prescribing the drug in order that it does not accumulate in the tissues, because when kidney function is lowered sulfanilamide is not excreted in a normal manner.

KNOCKING KNEES FROM PARALYSIS AGITANS

To the Editor:—**A woman patient is in her tenth year of paralysis agitans. On account of the constant spasm of her adductor muscles her knees are incessantly pressing together, causing redness and tenderness but not, thus far, ulceration. She has tried to relieve the knees by placing between them a thick soft pad of cotton and also a cotton pad with a hole in the center for sore bony projections to rest in but without much relief. I have tried to keep her knees apart by placing a wooden wedge between her thighs but she does not like it. What device do you suggest to relieve or prevent pressure of the knees and what medicinal application to the red skin do you suggest?**

M.D., New York.

ANSWER.—A bland ointment may be used for the skin until pressure is relieved for sufficient time to permit it to heal. It is important to keep the skin surfaces from touching. The best treatment is the adductor tenotomy and obturator neurectomy with the application of casts to each leg and foot with a cross bar maintaining moderate abduction. The cast should go from the bases of the toes to a point above the knees. A brace can be made with cuffs above the ankles and above the knees and two cross bars.

SPLENECTOMY FOR CONGENITAL HEMOLYTIC ANEMIA

To the Editor:—**What is the proper treatment for congenital hemolytic anemia with red count of less than 3,000,000? Beckman mentions only splenectomy, which a judicious surgeon has refused to do in the case under consideration. What about marmite or liver or stomach extracts by mouth or injection?**

F. E. Dargatz, M.D., Kinsley, Kan.

ANSWER.—The only known specific therapy for congenital hemolytic anemia is splenectomy. Medical therapy, including the measures mentioned, and all other forms of antianemic treatment have not been found of any value. The results reported with splenectomy are excellent. The symptoms of anemia and jaundice, which are due to excessive destruction of the spherocytes in the spleen, are promptly and permanently relieved, although the spherocytes and increased cell fragility persist. Splenectomy is indicated if acute attacks of hemolytic jaundice occur or if the anemia becomes chronic and progressive. The operative mortality is relatively low, ranging from 6.5 per cent in adults to 11.5 per cent in children.

CATARRHAL OTITIS AND SUPPURATION

To the Editor:—**Is it the general belief of otologists that sulfanilamide given in cases of catarrhal otitis media will frequently prevent a suppurative otitis media?**

M.D., New York.

ANSWER.—It is difficult to say what the general belief of otologists is in answer to this query.

If, by catarrhal otitis, a mild inflammation in the middle ear is meant, then having made this diagnosis one should not expect suppuration to occur. Should an abscess arise in the ear when the diagnosis of catarrhal otitis was made earlier in the course of the illness, it would be better to revise the first opinion and say that a suppurative otitis existed in its early stages.

Catarrhal otitis, by definition being a condition which improves by itself and usually without the need of surgical intervention, would therefore not be prevented by treatment from becoming a suppurative process.

BARBITURATES AND LONGEVITY

To the Editor:—**Is there any evidence that the frequent use of phenobarbital, soluble barbital or the new barbituric acid derivatives has any effect on the length of life?**

M.D. West Virginia.

ANSWER.—One cannot state that the frequent use of strictly therapeutic doses of a barbiturate shortens life by direct action. There are many factors concerned with longevity which are influenced adversely by the abuse of any of the barbiturates; hence the length of life must be influenced in many cases.

MENSTRUATION AND ALLERGY

To the Editor:—**In The Journal, Feb. 10, 1940, page 513, there is an answer to a question about the relation of endocrine activity to premenstrual asthma. It is important to realize that bronchial asthma due to inhalants and particularly to foods may occur before, during or after the menstrual period. Such underlying allergy is activated by the menstrual cycle in such a way that various allergic manifestations are exaggerated or produced through the secondary influence of wind, heat, cold or other physical or emotional factors. Thus patients with asthma occurring only around the menstrual period should receive most careful study with the possibility of inhalant and particularly food allergy in mind. Careful cutaneous testing with proper hyposensitization therapy should be carried out, and food allergy should be studied with the aid not only of cutaneous reactions but also of trial diets over a considerable period. During such a period of diet trial, adequate protection of nutrition and weight must always be emphasized. Experience of allergists lends little evidence to the possibility that disturbances in ovarian functions are primarily responsible for bronchial asthma or for any other allergic manifestations.**

Albert H. Rowe, M.D., Oakland, Calif.

Council on Medical Education and Hospitals

ANNUAL CONGRESS ON MEDICAL EDUCATION AND LICENSURE

Thirty-Sixth Annual Meeting, held in Chicago, Feb. 12 and 13, 1940

DR. RAY LYMAN WILBUR, Stanford University, Calif., in the Chair

COUNCIL ON MEDICAL EDUCATION AND HOSPITALS

FEBRUARY 12—MORNING

Report of the Council on Medical Education and Hospitals

DR. RAY LYMAN WILBUR, Stanford University, Calif.: This article appeared in full in THE JOURNAL, March 30, page 1141.

Addenda to the Agenda for 1940-1950

DR. ALAN GREGG, New York: This article appeared in full in THE JOURNAL, March 30, page 1139.

The Goal of Medical Education

DR. IRVIN ABELL, Louisville, Ky.: This article appeared in full in THE JOURNAL, March 30, page 1146.

Graduate Work in Medical Areas

GEORGE D. STODDARD, PH.D., Iowa City: My remarks bear on the advanced work that a medical student, or a student interested in medical problems, may undertake within the regular university plan. It is work which if pursued systematically may lead to the master's degree in one full year, or to the doctor of philosophy degree in three years. I shall present a few illustrations that may be helpful by way of opening the question for further analysis. I shall mention one or two matters in organization and research development at the University of Iowa. Illustrations could be drawn from other institutions, for none of us at Iowa feel that we have arrived at any solutions. In working toward a master's degree in the Graduate College we have been criticized because of insistence on a minimum time requirement. No matter how brilliant and resourceful the master's candidate, we require the measure of a full year of work. This means that some students will go far indeed in the understanding and exploration of their subject matter. Conversely, at the subsistence level of academic activity any graduate student seeking the master's degree will be subjected to a year's trial. Nobody has to count credits unless he feels like it. We are interested in a year of work because we feel that this is something tangible, even predictable within limits, and a unit that encourages good planning on the part of both students and staff members. The student who has his M.D. registers in a single course, once for each of two semesters. A thesis is required. Advanced instruction is given in cooperation with other departments of the College of Medicine. Registration is in the Graduate College. This plan gives the College of Medicine complete control over the content and methods of the year's graduate work. In this relationship the Graduate College is a kind of holding company that has access to the mysteries of degree granting and convocation, together with limited funds in support of research assistants and laboratory equipment.

We have few such arrangements in medical or other areas, but I believe that this one sets what is for us a desirable pattern. One reason why we find it necessary to be credit minded in some fields is that students are allowed to transfer from other departments and other institutions on such a casual basis that the concept of a year's work is reduced to a quilt pattern of small pieces. If a student would arrive at the beginning of an academic year and stay there, we could dispense with a large amount of credit counting and credit transferring machinery. What we need is a genuine desire to add to one's knowledge and fitness through authentic scientific experience; and, as a corollary, to indulge the hope of making a contribution of some theoretical or practical significance.

It is not easy to organize medical departments for the encouragement of graduate work on the part of staff members and students. Staff members are frequently assigned heavy teaching and clinical schedules, and to these may be added the pressures of private practice and social service to the community. Given a subsidiary status, advanced work is almost certain to languish. In many universities there is inadequate support in the form of scholarships and research assistantships; too little money for technicians, for apparatus, supplies and publication. Much depends on the head of the department and on the dean of the medical school, but in some universities their combined power would not be sufficient to loosen the strings of research support. A subtle deterrent appears in the lack of interest in carrying on research or in providing research opportunities for students. Of course this problem is not peculiar to medicine. It may be that the research technics in some fields have gone beyond the ability or experience of a particular staff member or department head. He may, in effect, demonstrate self protection in not starting something that would take bright young students beyond his mental preserves. He may have become skilful and truly wise in medical practice and demonstration while growing rusty on the detailed methods of mathematical, physical or chemical analysis.

There is no general solution. Some professors will show great energy in the development of laboratory and other facilities for advanced technical work. Others will feel that they cannot afford to do this but will be happy to employ and guide technical assistants and staff members. The test, after all, is pragmatic. If, as the Council report says, there is some relation, presumably causal, between research production and general medical excellence, we should do everything possible to encourage the one, if only to advance the other.

The Council's report on medical education speaks of "the elevated dignity of the profession." This unique place has been maintained through medical standards and ethics slowly built up over the centuries. Members of this congress know better than any layman how close the ideal came to disappearance in the pre-Flexnerian days of the multiplication of medical schools and dangerous submarginal enterprises. There is general agreement among educators that no profession, and no area of public service, has done as well as medicine in putting its technical and educational house in order.

The signs are plentiful that leaders in medicine are paying heed to the powerful forces that cut across our national life. I suppose, in the long run, the physician must give the people what they want. In medicine, the validity of such wants can always be established by the medical profession itself.

The medical student, some time during his academic career, should secure a liberal education. The tendency has been toward a standard baccalaureate curriculum. Possibly the premedical career of many students involves a heavy proportion of chemistry, biology and related subjects, such that the liberal arts are really the subordinate or fundamental sciences on which the structure of medical professionalism is to be erected. Such students coming up through a technical curriculum may have only a modicum of experience in the social sciences, economics, sociology, psychology or public administration. Like most students they will not feel at home in these areas and may tend to reject or oppose social change as something unscientific or radical.

Perhaps the education of a medical student, like that of other highly selected professional groups, should be tripodic in character. It could be rooted in liberal education, in ancillary education and in special education. Some subjects, like economics, are probably no longer so much a part of the liberal arts as originally conceived, as they are necessary mental equipment for every person in the professions.

It is my feeling that the university has been negligent in making available, at appropriate times and in useful sequences, the insights needed by its professional students. It occurs to me too that the problem cannot be solved by suddenly appearing before a dean of medicine or a medical committee with a proposal, springing from the liberal arts or graduate areas, to add a semester or a year of courses to the already overloaded curriculum of the medical student.

The hope for the discovery of talent and for broad training is not wishful thinking. The demand is here. The number

of physicians on full time payrolls has increased markedly over the past few decades. If this trend proves to be consistent with the patient's welfare, with professional standards and with public economy, we may expect it to endure. The question is not unrelated to individual psychology. The physician in training may increasingly prefer a ten to one chance on a $5,000 guaranteed salary, with a ceiling perhaps two or three times as high, to a competitive society in which a substantial percentage of doctors earn less than $3,000 while a handful get into the high income brackets.

We may agree that social or political reform should not be taken out of the hands of the medical profession. Rather the reverse is indicated, namely that the medical expert take such leadership into his own hands in order that whatever is done may be well done, on a durable and scientific basis. I enter a plea for the doctor as social scientist, and the doctor as a leading spirit in governmental affairs. I venture the prediction that with increasing governmental sponsorship of the activities of physicians there will come a reciprocal relation of the physician to the government. He will not dominate a government of laws, but his may be the determining voice. Practically this would mean in our city, state and federal governments a higher proportion of physicians and, I should hope, of scientists, of scholars and of creative artists.

Trends in Liberal Arts Education

GEORGE A. WORKS, ED.D., Chicago: The last decade has been a period of pronounced flux in higher education. The conditions have been so fluid that it is not practicable to attempt to give a comprehensive view of the numerous adjustments and adaptations that are being made in curriculums and methods of instruction in the liberal arts. Colleges of liberal arts have been designating the first two years of their programs as lower division or junior college work, and the third and fourth years as upper division or senior college work. The first two years have been characterized by efforts to make them an extension of the general education of the secondary school. Several factors have contributed to this change in the nature of the work done during the first two years. First, the feeling of educators in the liberal arts that students were not obtaining the integrated view of life that should result from the study of the main disciplines. The marked extension of knowledge through research in all the fields of the arts and sciences in the last generation has been accompanied by a striking multiplication of courses in colleges and universities. With this growth of information there has been a tendency to segment minutely the different fields of knowledge, with the result that students have found it necessary to take a large number of courses in a subject if they are to have an overview of it. This had left them only limited opportunities to elect in other departments of knowledge. As a consequence, students who complete the work of a liberal arts college have not come out with the integrated outlook in the liberal arts that was possible in the colleges of fifty or seventy-five years ago.

In the difference between the limited offerings of those days and the ample offerings of the present time is to be found a partial explanation of why the college of liberal arts of the earlier day may have produced students with a more nearly adequate comprehension of the relationships among the major fields of learning than they get under the present program.

Another factor that contributed to the destruction of the unity of the college of liberal arts was the elective system. Recent years have witnessed a tendency to return to a greater measure of prescription than was generally followed a generation ago. These trends, prescription and the development of comprehensive courses that have been pointed out with reference to the freshman and sophomore years represent an effort to restore to the student a larger opportunity to secure that integration of knowledge which is believed to have characterized the earlier days of the college of liberal arts. Another force of a different character has had its influence. Reference is made to the student mortality in institutions of higher learning. The studies that have been made show that about half of the students leave college before completion of the requirements for the bachelor's degree. Most of this academic mortality occurs by the end of the sophomore year. This heavy loss of students has raised questions regarding the values obtained by those students from the early years of an educational program developed with the emphasis on the preparatory value of the first two years of work for the specialization that characterizes the work of the junior and senior years in the liberal arts college. As a result, many colleges of liberal arts are revising their offerings of the first two years in the direction already discussed.

A further impetus to this revision has come from the view that the marked influx in recent years of students in higher institutions has been accompanied by a marked deterioration in the intellectual level of the entering freshman. I made a careful analysis of the studies in this field and was not able to substantiate the generally accepted point of view. This study appeared to justify the following statement: "The data available fail to show any appreciable deterioration in the intellectual quality of entering freshmen in those institutions where studies have been made on objective bases. In this respect the data are not in accord with the commonly expressed view on this subject. In making this interpretation it should be borne in mind that these studies are available over only a comparatively brief span. Perhaps if comparisons were available with the freshmen entrants of fifty or sixty years ago the story would be a different one."

Colleges need a period of comparative freedom from the requirements of professional schools to develop programs of instruction adequate for the needs of their student bodies. As to the trends at the senior college level, first there seems to be a tendency toward encouraging a greater breadth of preparation on the part of students. With the expansion of offerings by colleges, some minimum amount of specialization for each subject was designated or a minimum percentage of the senior college work that must be presented in the student's major subject was stipulated. This left the student free to carry his specialization as far beyond these minimums as he desired within the limits of his time and the offerings of his college. The influence of graduate schools, the requirements of professional schools and the desire of departments for students have had a tendency to cause students to increase their specialization to a marked degree at the senior college level. A reaction has set in and colleges are now taking steps to limit the degree of specialization at the senior college level.

A second trend at the senior college level is the comprehensive examination, which has been in use in a few institutions for some years. Through the comprehensive examination it is hoped that the student will be brought to synthesize his knowledge as he grows in his acquaintance with the several disciplines. It is regarded as a means of getting the student to realize the importance of securing a working unity in his learning. It is still in the experimental stage.

Other trends in liberal arts education are evident. Illustrations are furnished by the growth of the tutorial system and other means of individualization of instruction, adaptation of curriculums and instruction to the abilities and needs of the individual, and a growing recognition that the student should be aroused to a realization that all education is self education.

A word of warning should be given regarding the prevalence of those trends that have been discussed. Institutions will be found in which one of the trends is not only lacking but is opposed by the faculty and administration. There may be cases in which not one of them is considered to be a desirable feature. Fortunately, the American college of liberal arts is not cast in a mold of complete uniformity.

The final phase of this discussion is a consideration of premedical requirements. Medical colleges specify subjects which they require for admission and these vary from school to school. The differences are not great enough to be of marked importance were it not that each student usually applies to several schools for admission and as a result his program in the liberal arts college is determined not by the requirements of any given school but by the least common multiple of the requirements of several schools. It is evident that medical schools have two sets of requirements for admission, one quantitative and the other qualitative. In the past much of the emphasis has been placed on the quantitative requirements. The colleges of liberal arts welcome the signs that medical schools are shifting their attention from the quantitative to

the qualitative requirements. It will leave to liberal arts colleges a greater degree of freedom in pursuing their objectives. It is suggested that medical schools may turn to colleges of liberal arts for more assistance regarding the qualitative characteristics of applicants. These colleges would welcome such a movement, as many of the qualities that will be specified are certain to have a wholesome reaction on students when made known to them during their period of undergraduate study.

FEBRUARY 12—AFTERNOON

DR. JOHN H. MUSSER, New Orleans, in the Chair

Program for the Instruction of Interns

DR. NATHAN B. VAN ETTEN, New York: In presenting a pictorial study of intern education we are making a record of obedience to the requirements of the Council on Medical Education and Hospitals and of the College of Surgeons. The Morrisania Hospital is one of the twenty-six municipal hospitals of the city of New York. Its normal bed capacity of 539 is frequently exceeded, and with an average patient stay of nine days a large clinical procession is reviewed by its interns and residents. Its student body is composed of fourteen residents and thirty-four interns, a ratio of interns to patients of one to fifteen. In order to qualify for endorsement, an effort has been made to carry out in detail the letter and the spirit of the Council's requirements and to go further into the field of educating interns in the practicalities of medical care, in order to prepare them for similar problems which may later appear in their private work.

Medical education is far from a finished procedure, partly because it attempts to do too much through the long years devoted to it. In spite of eight college years required for the march to the degree of doctor of medicine, so much time is taken from the serious business of teaching practical clinical doctoring of real people, by diverting their attention to smatterings of specialties, that they are confused young people when they get their degree.

At the Morrisania we are impressed with the fact that few new interns have a practical understanding of a medical career. The Council undoubtedly desires to raise the quality of medical education. It will be a real accomplishment if it can raise the level of medical intelligence of the average doctor to fit him for better care of the average patient.

The average doctor must not be frightened out of confidence in his ability to take care of the average surgical, obstetric or medical problem. The general practitioner is one of the most valuable citizens in this republic, and the right kind of education must be aimed at him. The force of opinion may demand a better practical education for the general practitioner so that he may be able to render better medical service to low income people. The Council would probably do well to resurvey all medical schools to discover failures to solve this problem. The Council has the equipment, personnel and funds to do this work and I believe should be encouraged to undertake it.

Ten years ago a young man entered the administrative service of our hospital and so quickly showed an unusual interest in intern training that the executive direction of it was assigned to him. Although every encouragement was given to inquiring minds, the greatest emphasis was placed on the practical application of medical knowledge.

In 1936 Dr. Nathan Smith developed a scheme for intensive training in the outpatient department where the intern could closely observe ambulatory patients, such as he might meet in his own office. This has proved to be a successful adventure into reality.

[Dr. Nathan Smith's discussion of the motion picture will appear in the Student Section of THE JOURNAL.]

Medical Education—1905 to 1940

DR. MORRIS FISHBEIN, Chicago: This article appeared in full in THE JOURNAL, March 30, page 1147.

The Navy Looks at Education

DR. H. W. SMITH, Washington, D. C.: The Navy is not directly concerned with any system of undergraduate instruction. But, since it takes the product of the current system, we are interested in how well that product is being prepared to function in the Navy and we are in position to observe a cross section of it. One reason why private practice is the lagging member of modern medicine is that ungoverned specialization dominates the field of education. Specialization to the degree of provincialism has become a feature of our educational system. Of the candidates taking the examinations of the National Board last June, the ten making the highest average grades in part I included seven men from two schools, whereas the ten making the highest average grades in part II included only one from the two schools, and he was not among those listed in the honor roll for part I. May it not be relevant that in our ten leading medical schools 40 per cent of their faculty members have only a doctor of philosophy degree? Are not instructors such exclusive specialists that our students have disjunction set before them as a normal pattern?

To restore coordination to our faculties, it will be necessary to depart from a principle of medical education quoted in the recent report of this Council: ". . . that in the medical sciences, such as anatomy and physiology, there must be experienced teachers, trained in their respective subjects, rather than practicing physicians . . ." Conforming to this principle, exclusive specialization has been the rule in teaching institutions since 1914; and I believe it to be a result that graduates are well instructed in preclinical subjects as independent entities but are not practiced in bringing those subjects into relation with one another and with the symptom complex presented by the patient. Certainly we find our candidates deficient in clinical application.

The one practicable expedient is to adopt some principle which shall guide us in framing an educational system and also serve the graduate in his practice. The principle suggested is, in substance, coordination designed to correct the dispersive effects of specialization. Imbued with that doctrine, the physician will extend his cognizance to all conditions that might affect the life of a patient. In referring to that principle, I have borrowed from Jan Smuts the term "holism" to express the view that the morbid unit is the whole individual and not a constituent part. A point of view is to be planted and nurtured in each student. His outlook thereby will be immeasurably widened, and the realization so gained of the extent of his field of endeavor will effectually prevent his mind from ever becoming shut in one little compartment of medicine or being engrossed in one aspect of a case.

The more important phase of the general problem is not how to broaden the specialist but how to equip the general practitioner that he may serve acceptably when the services of specialists are not procurable. As you know, the farmer, the share cropper, the migrant worker, the slum dweller and the unemployed are fast assuming status as wards of the government; and study is being given to measures for bringing to those elements as high a standard of medical service as is available to others more fortunately situated. This project directly concerns every physician and student, for, unless the profession itself can find ways of bringing about a more uniform distribution of effctive medical service conformable to current ideologies, alien agencies will intervene. Because of contemporary social and political trends, I suppose there is no more pressing problem in medical organization today.

The Navy at an early period encountered this sort of difficulty. Members of the medical corps must on occasion conserve the health of personnel without any of the adjunct services available in our medical centers.

Because of our experience I presume to suggest an answer to the question of how the scheme of medical education may be altered to the end that geographic and financial inequalities in the availability of efficient service may be compensated. The answer I suggest to this phase of the problem is the same as that which I have proposed for provincialism among specialists: the inculcation of a controlling doctrine to make each physician aware that his mission is to contribute to the maintenance in individuals of an ideal state we term "health," and that he is not fulfilling his duty unless, so far as humanly possible, he restores his patients to full function. It may be even that our hospital staffs should be reorganized to the better attainment of this desirable end. If the physician starts out on his career with good basic training and is guided thereafter by a conception of the patient-person, the conditions

beyond his remedying will be few. The country practitioner may now and then lose a patient who might have been saved by early recourse to a specialist, but the ninety and nine patients who would elsewhere be treated by specialists will be restored to health equally well by him through intelligent application of his limited resources.

In 50 per cent of patients resorting to a doctor there is no physical lesion demonstrable then or later; and, in 75 per cent, psychic disorder is the chief if not the sole factor of morbidity. Therefore it is reasonable to expect that the practitioner, habituated to our doctrine of holism, may be as successful as the typical specialist or even the clinic.

How can this principle be incorporated in formal education? At the Naval Medical School I discontinued all systematic and schismatic instruction in the basic sciences—chemistry, bacteriology and pathology. Utilizing the time gained, I instituted two weekly exercises, one in clinical medicine and one in clinical pathology, with a senior internist acting as chairman and all instructors participating. At each exercise, the case of the day is presented by a student officer. Then each instructor in turn discusses phases pertaining to his subject. The chairman finally reviews the case briefly. By selection of cases not only is the whole range of medicine reviewed but all the ancillary subjects related to one another and to the individual patient. Thus the habit of comprehensive regard is firmly rooted. In an undergraduate school the sciences cannot be eliminated but they can be related. The unifying concept frequently put into operation becomes a lasting force through which the proper goals of medicine have been more fully attained.

The Work of the National Board of Medical Examiners During Its First Quarter Century

DR. LOUIS B. WILSON, Rochester, Minn.: When the National Board of Medical Examiners was founded in 1915, by Dr. William L. Rodman, he stated its aims and purposes to be "to establish a standard of examination and certification of graduates in medicine for the whole United States and its territories through which by the cooperation of the state and territorial boards of medical examiners its licentiates may be recognized for licensure to practice medicine." The present personnel consists of two representatives from each of the three federal medical services, two from the Council on Medical Education and Hospitals of the American Medical Association, three from the Association of American Medical Colleges, five from the Federation of State Medical Boards, and twelve elected members. In addition to the central board, a large number of highly efficient subsidiary boards were organized in 1922, largely for conducting part III examinations in widely separated cities.

After careful study of the detailed report of its commission and the valuable suggestions from its visitors from abroad, the National Board in 1922 changed its examination plans. The examinations were divided into parts I, II and III. Part I is given at the end of the first two years of the medical curriculum, part II immediately after graduation and part III after one or more years of internship. Part I covers mostly the basic medical sciences, part II covers mostly the theory of clinical medicine and part III covers the application of the medical sciences in diagnosis and treatment and a practical test of the candidate's clinical knowledge. This plan is based largely on the long experience of English and Scottish boards. Parts I and II are based entirely on written examinations to preserve a strictly uniform national level. The practical feature of the part III examination has required the organization of carefully selected local subsidiary boards in many large cities throughout the country. These subsidiary boards are composed almost entirely of local physicians. Eighteen years of experience with this system has thoroughly demonstrated the wisdom of the plan.

I am not suggesting that the National Board of Medical Examiners is omniscient concerning essential requirements for a high grade of general practice, that it is entirely unprejudiced concerning the relative emphasis which should be placed on the several phases of the candidates' professional attainments, that its plan of examination has no defects or that it is infallible in evaluating all candidates' professional knowledge; but its final judgment of the candidate's fitness to practice general medicine is based on a careful study of the requirements for general practice and a reliable evaluation of each candidate's attainments in these professional qualifications. The certified diplomates of the Board have proved by their subsequent professional practice that their certification was warranted. Although the number of candidates has increased to more than 1,200 a year, this represents less than one fourth of the annual graduates. It would seem that ways should be found to permit at least two thirds of the graduates of American medical colleges to take the examinations. Although the fee for examinations is not large, it is more money than is available to many recent graduates. The question arises whether some provision from outside sources might not be made to permit schools to subsidize their higher grade but financially embarrassed graduates so that more of this group might take the examinations.

The greatest accomplishment of the National Board in its first quarter century has been the attainment of the objective specified by its founder. The diploma of the National Board is now more widely accepted by licensing bodies than a certificate of passing any other examination in the world. Almost all states and territories now accept its examinations in whole or in part in lieu of their own examinations. The same is true of the federal medical services. It is true of the qualifying boards of England, Scotland and Ireland. Indeed it is also true of a number of medical schools, which now accept in part or entirely the examinations of the National Board in lieu of their own examinations for graduation.

Eleven years ago the National Board expanded its small bulletin into a publication of greater size under the name of the *Diplomate*, the most significant activity of which from the standpoint of this congress would seem to be its publication of the results of each examination soon after its completion. One of the best uses which can be made of the published data of the National Board concerning success in the several basic sciences of graduates from various schools is its consideration by prospective medical students. A number of young men who have consulted me concerning which school to go to have said that they have read the files of the *Diplomate* and been much impressed by the suggestive matter which it contains. Many of the specialty boards have modeled certain phases of their examinations on those of the National Board. The accomplishments of the senior specialty boards so far have thoroughly justified their existence.

Any national examining board must base its standards and methods on educational standards and clinical practice. These factors are anything but static. There is perhaps too great a tendency to continue emphasis on some factors the clinical significance of which has become obsolete. But age old traditions should be changed with great caution. Increased emphasis on newly discovered phases of basic medical science and clinical practice is sometimes as difficult to develop as is the reduction of emphasis on factors that are becoming obsolete. Neither of these things can be accomplished by an examining board without cooperative action between educational institutions and organizations of clinicians. Although national boards may suggest changes by their examination questions, the whole problem can be solved only by cooperation on a national basis between all agencies concerned in the improvement of the practice of medicine. Such cooperation should be the subject of careful consultations by the American Medical Association, the Association of American Medical Colleges, the Federation of State Medical Boards and all national boards of medical examiners, general or special.

American Contributions to Medical Education in China and India

DR. EDWARD H. HUME, New York: For more than a hundred and twenty years, American physicians have taken part in medical work in Asia. From the beginning, Americans in China have had to discover that China was the home of an ancient culture whose patterns in trade, in social relations and in education had been set for centuries. They little understood the extent of the shock caused to Chinese nationality by their intrusion into the manifold life of this old country. In A. D. 1068, two years after William the Norman entered

Britain, the great emperor Shen Tsung of the Sung dynasty ordered state medical schools to be created. The examinations were definite: one on the principles and one on the clinical practice of medicine and surgery, one on physiology and anatomy, one on differential diagnosis by the pulse and one on prescriptions and therapeutics.

The first American physician of whom we have record was a Dr. Bradford of Philadelphia, who aided in the conduct of a free dispensary at Canton. By 1830 the first American missionaries to reside permanently in China arrived in Canton, Elijah C. Bridgman, the pioneer appointee of the American Board of Commissioners for Foreign Missions, with his colleague David Abeel.

Modern medical teaching in China began in the Canton Hospital, where Peter Parker did his work. In 1870 a class of regular medical students was admitted and the translation of textbooks taken up in earnest. In 1879 Chinese women students were first admitted. The medical work of these pioneers is noteworthy not only because their medicine and surgery commended themselves to the Chinese but because they launched opium refuges, fought against the old practice of foot binding and took part in the training of medical assistants and nurses. In January 1896 an agreement was entered into between St. John's College and Dr. Boone, whereby the Medical School of St. Luke's became the Medical Department of St. John's College. The purpose now was to train physicians and surgeons of a higher grade in English; the course was one of four years, at the end of which a certificate was granted to successful candidates. Medical education in Peiping began in 1896. In 1894 a coeducational medical college was started at Soochow. Another medical class was started in 1899 at Ichow. One of the definite purposes of these early teachers was the supply of proper Chinese textbooks. The first Protestant nurse to reach China was Miss Elizabeth McKechnie, who arrived in Shanghai in 1884. By 1907 Miss Cora E. Simpson, an American nurse, launched the Florence Nightingale Nurses' Training School. By 1922 the members of the China Medical Missionary Association were giving serious thought to unified programs in medical education. At a conference in Hankow in February 1910 the first Chinese was admitted to active membership in this association. By 1921 the total number of medical colleges in China was twenty-four. Eleven of these were Chinese government or private institutions, eleven were controlled by Westerners, and two were under cooperative direction. Of the eleven under Western control three were entirely American, while three were jointly staffed by Americans and British. Both the cooperative institutions were launched by Americans working with Chinese physicians. These were the Kung Yee Medical School in Canton and the Hunan-Yale Medical College in Changsha. Thus in eight of the eleven institutions of note in China, a score of years ago, Americans were providing both staff and financial aid.

The Peking Union Medical College, dedicated in 1921, was the outgrowth of a plan launched in 1906 by Dr. Thomas Cochrane, who united the teaching units of the American Congregational, the American Methodist and the American Presbyterian teaching hospitals with those of two British societies in North China to form a single teaching center. In 1914 a medical commission from the Rockefeller Foundation visited China. On the basis of its report there was formed the China Medical Board of the Rockefeller Foundation. In the summer of 1915 this board sent out another commission, which recommended cooperation with the existing Peking Union Medical College, taking over its land and buildings and agreeing to provide the maintenance and construction costs for a new institution. Thus the work of three American and two British missionary societies, which had been consummated in 1906 and where the first medical class graduated in 1911, found its life continuing in the new center, which has been a landmark in the old Chinese capital for twenty years both because of its architectural beauty and because of the comprehensiveness and thoroughness of its educational plan. No other medical school in the Far East surpasses the Peking Union Medical College in the caliber of its staff and its teaching program.

Six medical schools in China today represent the participation of American educators: 1. Cheeloo University Medical School at Tsinan. 2. St. John's University School of Medicine at Shanghai, one of the oldest in China. About thirty years ago a group of graduates of the University of Pennsylvania, who had started work in Canton, moved to Shanghai and became the faculty of medicine of St. John's. The institution is designated the Pennsylvania Medical School of St. John's University. 3. Women's Union Medical School at Shanghai. This institution, founded by the Women's Union Missionary Society of America, suffered great damage when the Japanese aggression began in 1937, and the work is now being carried on within the foreign settlement. 4. The Hunan-Yale College of Medicine at Changsha, started in 1914 by an American and a Chinese group of educators working together; the first dean was Dr. Edward H. Hume, a graduate of Johns Hopkins. Since the war with Japan began, it has been necessary to move the institution to the capital of the adjoining province of Kweichow. In this interior city of Kweiyang the college is pressing forward with a reduced budget but with increased morale and with a unique opportunity for service in the area behind the lines. 5. West China Union University Medical School at Chengtu, which was founded more than twenty years ago by a group of American, British and Canadian doctors. 6. The Sun Yat-sen Medical School in Canton. The war has driven the teaching aspects of this work out of Canton. Some of it is being done in Hongkong, through the courtesy of the University of Hongkong, while some of the clinical teaching is carried on at a smaller town in the north of Canton province.

Each of these seven centers is an outpost of North American medicine, in which British teachers have also taken an active share. In the years during which these institutions were growing, the government too became active in the field and laid the foundations for great teaching centers in a number of important Chinese provincial capitals. Without exception these Chinese institutions have moved west because of the pressure of the Japanese invasion. They have now taken up their work in cooperation in three important provincial capitals in the Far West. Continued Japanese control of parts of eastern China may prevent the return of these schools to their original bases. On the other hand, the Japanese attack has opened up new vistas for the whole field of medical education, as it has for education in other fields and for social and industrial development. The president of the Chinese Medical Association has invited American universities to share in building up senior teaching staffs for three of these West China government centers. There may be experienced American medical teachers who would be willing to take a sabbatical leave, others who are approaching retirement and who would welcome a chance for new service, and still others who might be interested in an adventure to teach in free China, which is facing the adversities of war. The six schools in which North Americans are working are continually seeking replacement for their staffs.

The first American physician to begin work in India was Dr. John Scudder, who went there in 1819, did dispensary work and later gave himself more definitely to church work. Since that early date hospitals have been started in many parts of India, until the total of North American hospitals (including Canada and the United States) in 1936 was about 100. The situation in India differs from that in China with regard to medical education. In China, practically all beginnings of modern medical work were launched by missionaries, in hospitals or dispensaries, in medical schools or nurse training schools, and in other forms of health activity. In India the British government has built up a widespread program of hospital and dispensary work and of medical education. At first all training was given in medical schools, this term being used to connote institutions whose graduates had a license to practice but were not trained in the fundamental sciences or given a university degree. Within the past twenty years the more advanced provinces have launched universities, with schools of law, medicine and engineering, where a higher degree has been conferred on graduates. University teaching institutions are spoken of as medical colleges, to distinguish them from the medical schools already mentioned.

To Sir William Wanless, M.D., was due the founding, about forty years ago, of a medical school at Miraj in western India, controlled and supported wholly by the Presbyterian Board in the United States. It is a question whether, with the limited facilities for the teaching of anatomy, physiology, pharmacology

and other basic sciences, and with the too infrequent possibility for postmortem examinations, this institution should attempt to be a medical school much longer. It is adapted, rather, to give extraordinary service as a hospital capable of training men for that far-flung rural health program so vitally needed everywhere in India.

At Vellore in South India a similar type of teaching was started three decades ago by Dr. Ida S. Scudder, granddaughter of the pioneer medical missionary to India. Although it was established in the first instance as a project of the Reformed Church in America, other societies joined the movement, until a cooperative Union Medical School for Women came into being. It has done notable work during the past twenty years and its graduates, all women physicians, are to be found in many parts of India. Up to 1937 the future of the Vellore Medical School seemed fairly secure, but in that year the government of the province of Madras, educationally the most advanced province in India, passed a ruling that there should hereafter be no more "medical schools" in the province but that only "medical colleges" should be recognized. The government gave effect to its own decision by closing up its own large women's medical school in the city of Madras and combining its staff with another medical school in that city, raising the combined institutions to the level of a medical college with university status. The Vellore school is now put on notice that, after the graduation of the present student body, no further students may be admitted at the old level. The institution must be stepped up to the level of a medical college of university grade, with the necessary staff, laboratories, bed facilities and variety of material.

Another school for women was started in Ludhiana, in the province of Punjab, at a point as far north in India as Vellore is south. This institution was largely the work of Dr. Edith M. Brown, an Englishwoman who has been successful in building up a teaching center whose staff consisted of Americans, British and Canadians. Punjab University, located at Lahore, the capital of the province, has recently granted recognition to the two lower classes of the institution and approved their being given university status. Whether the entire institution can be stepped up to the university level and gain recognition as a medical college remains to be seen. The obstacles are largely financial.

These three institutions—Miraj, Vellore (both American in establishment) and Ludhiana (British in management but with an international teaching staff)—will have to make radical changes during the years ahead. The governments of the several provinces are making fairly large provision for provincial medical teaching institutions, and it is likely that they will be unwilling to give grants to institutions conducted by other agencies. This situation would throw an almost intolerable burden on the three institutions. The Christian Medical Association of India, which unites those of Indian and Western nationalities in a large agency for dealing with all the problems involved, is strongly of the opinion that the Christian forces should maintain a medical college in India (that is, an institution at the university level) and that there should be but one such institution. Difficulties of transportation and language grow progressively less, and the missionary boards in Great Britain and North America can scarcely afford the cost of more than a single institution at the high level. If such a center should be agreed on it would have to be located in some appropriate place, while the other institutions which have taught in the past would remain in the picture by taking up some special medical feature of training, whether rural or other work. Major General E. W. C. Bradfield, the director of the Indian Medical Service, and other surgeon generals in the various provinces continue to insist that the work of medical missions is indispensable in a total health program for the land; but they urge that it seek out those fields of activity in which no government force can compete. These government officials suggest that the mission hospitals place increased emphasis on health work in the vast rural areas of India, giving special attention to chronic diseases. These suggestions are receiving the attention of all in the United States and Canada who are concerned with North America's share in medical education in India.

America has been at its best in pushing back horizons. Today there is set before us an opportunity to pioneer still further to the west. There is a new call for expansion in the use of our medical resources. This call for internationalism in medical education will include all the emphasis in that field which is being made by the Council on Medical Education and Hospitals. But more! Those who are to go overseas need special preparation, as in the field of tropical medicine. American contributions to medical education overseas have scarcely crossed the threshold of this new opportunity. We are offered here a fresh challenge to thought and constructive planning in a significant professional and social field.

(To be continued)

Medical Examinations and Licensure

COMING EXAMINATIONS

STATE AND TERRITORIAL BOARDS

Examinations of state and territorial boards were published in THE JOURNAL, March 30, page 1288.

NATIONAL BOARD OF MEDICAL EXAMINERS

NATIONAL BOARD OF MEDICAL EXAMINERS: Part II, May 1-2; Part III, June or July, to be given in medical centers having five or more candidates desiring to take the examination. Exec. Sec., Mr. Everett S. Elwood, 225 S. 15th St., Philadelphia.

SPECIAL BOARDS

AMERICAN BOARD OF ANESTHESIOLOGY: An Affiliate of the American Board of Surgery. *Oral.* Part II. New York, June 10-11. Applications must be received 60 days prior to examination. Sec., Dr. Paul M. Wood, 745 Fifth Ave., New York.

AMERICAN BOARD OF DERMATOLOGY AND SYPHILOGY: November 1940. *If a sufficient number of applications were received before March 1 an examination will be held at New York, June 10-14.* Sec., Dr. C. Guy Lane, 416 Marlboro St., Boston.

AMERICAN BOARD OF INTERNAL MEDICINE: *Oral.* In advance of the meeting of the American Medical Association. Applications must be on file six weeks in advance. *Written.* October 21. Applications must be on file by September 1. Sec., Dr. William S. Middleton, 1301 University Ave., Madison, Wis.

AMERICAN BOARD OF OBSTETRICS AND GYNECOLOGY: *General oral and pathologic examinations (Part II), (Group B)* will be conducted in Atlantic City, N. J., June 7-10. Sec., Dr. Paul Titus, 1015 Highland Bldg., Pittsburgh (6).

AMERICAN BOARD OF OPHTHALMOLOGY: *Oral.* New York, June 8-10; Cleveland, Oct. 5. Sec., Dr. John Green, 6830 Waterman Ave., St. Louis.

AMERICAN BOARD OF ORTHOPAEDIC SURGERY: Chicago, June 15-16. Applications must be on file on or before April 15. Sec., Dr. Fremont A. Chandler, 6 North Michigan Ave., Chicago.

AMERICAN BOARD OF OTOLARYNGOLOGY: New York, June 3-5. Sec., Dr. W. P. Wherry, 1500 Medical Arts Bldg., Omaha.

AMERICAN BOARD OF PATHOLOGY: New York, June 10-11. Sec., Dr. F. W. Hartman, Henry Ford Hospital, Detroit.

AMERICAN BOARD OF PEDIATRICS: Memphis, Tenn., Nov. 17, preceding the annual meeting of the American Academy of Pediatrics. Sec., Dr. C. A. Aldrich, 723 Elm St., Winnetka, Ill.

AMERICAN BOARD OF PSYCHIATRY AND NEUROLOGY: Cincinnati, May 17-18. Sec., Dr. Walter Freeman, 1028 Connecticut Ave. N.W., Washington, D. C.

AMERICAN BOARD OF RADIOLOGY: New York, June 7-10. Sec., Dr. Byrl R. Kirklin, 102-110 Second Ave., Rochester, Minn.

AMERICAN BOARD OF SURGERY: Various centers, April 1. Sec., Dr. J. Stewart Rodman, 225 South Fifteenth St., Philadelphia.

New York Endorsement Report

Mr. Herbert J. Hamilton, chief, Bureau of Professional Examinations, reports seventy-nine physicians licensed by endorsement from Nov. 15 through Dec. 20, 1939. The following schools were represented:

School	LICENSED BY ENDORSEMENT	Year Grad.	Endorsement of
Yale University School of Medicine	(1935), (1937), (1938)		N. B. M. Ex.
George Washington University School of Medicine	(1931)		Puerto Rico
Howard University College of Medicine	(1930), (1937)		New Jersey
Northwestern University Medical School	(1938)		Wisconsin
Rush Medical College	(1923)	California, (1935)	Wisconsin, (1937), (1938, 2) N. B. M. Ex.
Indiana University School of Medicine	(1935, 2), (1937)		Indiana
State University of Iowa College of Medicine	(1929), (1936)		Iowa
Louisiana State University Medical Center	(1937)		Alabama
Johns Hopkins University School of Medicine	(1932)		N. B. M.Ex., (1934), (1939) Maryland
University of Maryland School of Medicine and College of Physicians and Surgeons	(1937, 2), (1938, 2), (1939, 3)		Maryland
Boston University School of Medicine	(1938)		N. B. M. Ex.
Harvard Medical School	(1927), (1937, 2)		N. B. M. Ex.
Tufts College Medical School	(1933)		N. B. M. Ex.
St. Louis University School of Medicine	(1937)		N. B. M. Ex., (1938, 4), (1939, 3) Tennessee
Creighton University School of Medicine	(1936)		California
Cornell University Medical College	(1931), (1936)		N. B. M. Ex.
New York Homeopathic Medical College and Flower Hospital	(1913), (1935)		New Jersey
New York Medical College and Flower Hospital	(1937, 2), (1938, 2)		N. B.M. Ex.
New York University College of Medicine	(1934)		N. Carolina

Eclectic Medical College, Cincinnati	(1938, 3), (1939, 4)	Ohio
University of Cincinnati College of Medicine	(1939)	Ohio
Western Reserve University School of Medicine	(1937)	Ohio
Hahnemann Medical College and Hospital of Philadelphia	(1938)	Maryland, (1939) Virginia
University of Pennsylvania School of Medicine	(1935)	N. B. M. Ex.
Woman's Medical College of Pennsylvania	(1936)	N. Carolina
Meharry Medical College	(1939)	Tennessee
Baylor University College of Medicine	(1936)	Texas
Medical College of Virginia	(1937), (1938), (1939, 2)	Virginia
University of Virginia Department of Medicine	(1927), (1938)	Virginia
University of Wisconsin Medical School	(1933)	Wisconsin
Laval University Faculty of Medicine	(1935)	Ohio
Medizinische Fakultät der Universität Wien	(1912)	Maryland
Friedrich-Wilhelms-Universität Medizinische Fakultät, Berlin	(1919), (1923)	Ohio
Regia Università di Napoli Facoltà di Medicina e Chirurgia	(1936)	Maryland
Licentiate of the Royal College of Physicians, of the Royal College of Surgeons of Edinburgh and of the Royal Faculty of Physicians and Surgeons of Glasgow	(1937)	Texas

New Jersey October Examination

Dr. Earl S. Hallinger, secretary, New Jersey State Board of Medical Examiners, reports the written examination held at Trenton, Oct. 17-18, 1939. The examination covered nine subjects and included ninety questions. An average of 75 per cent was required to pass. One hundred and fifty-five candidates were examined, 123 of whom passed and thirty-two failed. The following schools were represented:

School	PASSED	Year Grad.	Per Cent
Yale University School of Medicine		(1938)	78.4
George Washington University School of Medicine		(1937)	75.5*
Georgetown Univ. School of Medicine		(1938)	77.5, 79.3, 79.8, 82.4, 86.1
Loyola University School of Medicine		(1938)	83.2, (1939) 82.7
Rush Medical College		(1937)	82.3, (1938) 80.6, 87.4
University of Illinois College of Medicine		(1937)	88
Louisiana State University Medical Center		(1939)	80.2
University of Maryland School of Medicine and College of Physicians and Surgeons		(1938)	76
Boston University School of Medicine		(1924)	77.6
Harvard Medical School		(1935)	83, (1936) 84.4
University of Michigan Medical School		(1936)	89.6
University of Minnesota Medical School		(1938)	89.2, (1939) 83.2*
St. Louis University School of Medicine		(1938)	77
Cornell University Medical College		(1935)	83.1
Long Island College of Medicine		(1938)	77.8, 79, 85.5
New York University College of Medicine		(1938)	83.3
Hahnemann Medical College and Hospital of Philadelphia		(1938)	76, 79, 79.1, 80.1, 80.5, 81.3, 86.4, 86.6
Jefferson Medical College of Philadelphia		(1937)	81.3, 85.3, (1938) 80.6, 81.5
Temple University School of Medicine		(1937)	76.6, (1938) 78.8
University of Pennsylvania School of Medicine		(1936)	85.6, (1937) 80.3, 88.6, (1938) 76.5
Woman's Medical College of Pennsylvania		(1938)	78.5
Marquette University School of Medicine		(1940)	75.6†
Medizinische Fakultät der Universität Wien		(1916)	75.4, (1918) 75.1, (1921) 75.4, (1926) 76.4, (1929) 76.1, (1930) 76.8, (1933) 75, 77.4, 78.3, (1937) 80.8
Université Libre de Bruxelles Faculté de Médecine		(1938)	79.7
Albert-Ludwigs-Universität Medizinische Fakultät, Freiburg		(1926)	78
Friedrich-Alexanders-Universität Medizinische Fakultät, Erlangen		(1921)	76.8
Friedrich-Wilhelms-Universität Medizinische Fakultät, Berlin		(1908)	77.1, (1930) 83.4
Ludwig-Maximilians-Universität Medizinische Fakultät, München		(1937)	77.7
Schlesische-Friedrich-Wilhelm-Universität Medizinische Fakultät, Breslau		(1911)	75.7, (1921) 81.5
Universität Leipzig Medizinische Fakultät		(1914)	77.6, (1924) 75.3
Vereinigten-Friedrichs-Universität Medizinische Fakultät, Halle-Wittenberg		(1900)	77.4, (1919) 83.6
Magyar Királyi Erzsébet Tudományegyetem Orvostudományi, Pecs		(1936)	76.5
Magyar Királyi Pázmány Petrus Tudományegyetem Orvosi Fakultasa, Budapest		(1924)	77.2, (1928) 75
Regia Università di Napoli Facoltà di Medicina e Chirurgia		(1936)	78
Regia Università degli Studi di Bologna. Facoltà di Medicina e Chirurgia		(1936)	77.5
Regia Università degli Studi di Padova. Facoltà di Medicina e Chirurgia		(1937)	82.8
Regia Università degli Studi di Roma. Facoltà di Medicina e Chirurgia		(1936)	80, (1937) 75.8, 76.5, 80.3
Universitatea Regele Ferdinand I-iu din Cluj Facultatea de Medicină si Farmacie		(1923)	76.7
Licentiate of the Royal College of Physicians, of the Royal College of Surgeons of Edinburgh and of the Royal Faculty of Physicians and Surgeons of Glasgow		(1938)	79.4, 81.3, 83.1, 83.4
Universität Zurich Medizinische Fakultät		(1935)	76.5, (1937) 77, (1938) 78.3
Université de Genève Faculté de Médecine		(1937)	80.4
Université de Lausanne Faculté de Médecine		(1935)	79.8
Osteopaths‡			75, 75, 75, 75.5, 76, 77.5, 77.5, 77.5, 78, 78, 78.5, 78.5, 78.5, 80, 80, 80, 80.5, 81, 83, 83, 83.5, 84.5, 85.5, 85.5, 86, 86.5, 86.5, 87, 87, 87.5, 87.5, 89.5, 91, 92

School	FAILED	Year Grad.	Per Cent
Georgetown University School of Medicine		(1938)	68
Temple University School of Medicine		(1938)	71.7
Karl-Franzens-Universität Medizinische Fakultät, Graz		(1920)	70.2
Medizinische Fakultät der Universität Wien		(1913) (1916)	63.7, (1922) 65.3, (1924) 52.3, 71.4, (1925) 69.6, (1934) 63.4 66.4
Albertus-Universität Medizinische Fakultät, Königsberg		(1925)	71.1
Friedrich-Wilhelms-Universität Medizinische Fakultät, Berlin		(1911)	69.5, (1927) 65.7
Julius-Maximilians-Universität Medizinische Fakultät, Würzburg		(1910)	71.2
Schlesische-Friedrich-Wilhelms-Universität Medizinische Fakultät, Breslau		(1926)	63.1
Universität Leipzig Medizinische Fakultät		(1933)	72.2
Magyar Kiralyi Erzsébet Tudományegyetem Orvostudományi, Pecs		(1930)	50.8
Magyar Királyi Pázmány Petrus Tudományegyetem Orvosi Fakultasa, Budapest		(1918)	34.6
Regia Università di Napoli Facoltà di Medicina e Chirurgia		(1932)	65.3
Regia Università degli Studi di Bologna. Facoltà di Medicina e Chirurgia		(1937)	70.1
Regia Università degli Studi di Messina. Facoltà di Medicina e Chirurgia		(1937)	56.2
Regia Università degli Studi di Padova. Facoltà di Medicina e Chirurgia		(1935)	68.7
Regia Università degli Studi di Palermo. Facoltà di Medicina e Chirurgia		(1920)	46.1
Regia Università degli Studi di Roma. Facoltà di Medicina e Chirurgia		(1937)	62.4, 69.8
Regia Università degli Studi di Siena. Facoltà di Medicina e Chirurgia		(1937)	65
Osteopaths ‡			57, 66.5, 68, 68, 69, 70.5

*License has not been issued.

† This applicant completed the medical course in 1938 and received his M.D. degree January 2, 1940.

‡ Examined in medicine and surgery.

New Jersey Endorsement Report

Dr. Earl S. Hallinger, secretary, New Jersey State Board of Medical Examiners, reports 161 physicians licensed by endorsement for the year 1939. The following schools were represented:

School	LICENSED BY ENDORSEMENT	Year Grad.	Endorsement of
University of Arkansas School of Medicine		(1937)	New York
College of Medical Evangelists		(1938)	N. B. M. Ex.
University of California Medical School		(1933)	California
Yale University School of Medicine		(1908) New York, (1936)	N. B. M. Ex.
Georgetown University School of Medicine		(1933)	Maryland, (1937) N. B. M. Ex.
Howard University College of Medicine		(1927)	Dist. Colum., (1936) Missouri
Univ. of Georgia Medical Department		(1914) Georgia, (1928)	Penna.
University of Georgia School of Medicine		(1934)	Georgia
Indiana University School of Medicine		(1937), (1938)	Indiana
State University of Iowa College of Medicine		(1935)	Iowa
University of Louisville School of Medicine		(1935), (1937)	Kentucky, (1937) New York, (1936) N. B. M. Ex.
Johns Hopkins University School of Medicine		(1935, 2)	Maryland
University of Maryland School of Medicine and College of Physicians and Surgeons		(1934), (1938)	Maryland
Boston University School of Medicine		(1935), (1936)	N. B. M. Ex.
Harvard Medical School		(1929)	New York, (1934, 2) N. B. M. Ex., (1935) Massachusetts
Tufts College Medical School		(1932)	New York
University of Michigan Medical School		(1929), (1936)	Michigan, (1932) N. B. M. Ex., (1936) New York
Detroit College of Medicine and Surgery		(1920)	New York
St. Louis Univ. School of Medicine		(1936), (1937), (1938, 2)	Missouri
Creighton University School of Medicine		(1936)	Connecticut
Columbia University University College of Physicians and Surgeons		(1933), (1934), (1936, 2), (1937), (1938)	New York, (1934), (1937) N. B. M. Ex., (1935) Massachusetts
Cornell University Medical College		(1933)	California, (1900), (1929), (1937) New York
Long Island College of Medicine		(1931), (1935, 3), (1936, 3), (1937, 2)	New York, (1931) N. B. M. Ex.
Long Island College Hospital		(1901), (1920)	New York
New York Med. College and Flower Hosp.		(1937, 3), (1938)	N. B. M. Ex.
New York Homeopathic Medical College and Hospital		(1934)	New York, N. B. M. Ex.
New York University College of Medicine		(1935, 3), (1936, 3), (1937), (1938)	New York, (1937) Maryland
University and Bellevue Hospital Medical College		(1914), (1929), (1930), (1933)	New York
University of Rochester School of Medicine		(1933)	N. B. M. Ex., (1934), (1935), (1936) New York
Duke University School of Medicine		(1937)	N. B. M. Ex.
Eclectic Medical College, Cincinnati		(1938, 4)	Ohio
Ohio State University College of Medicine		(1937)	Ohio
Hahnemann Medical College and Hospital of Philadelphia		(1937), (1938, 3)	Penna., (1938, 5) Maryland
Jefferson Medical College of Philadelphia		(1917), (1924), (1925), (1936, 2)	Pennsylvania, (1930) N. B. M. Ex., (1934) Ohio, (1918), (1937), (1938) New York
Temple University School of Medicine		(1927), (1928), (1930), (1934), (1935)	Pennsylvania, (1938) North Carolina
University of Pennsylvania School of Medicine		(1918)	New York, (1918), (1935) Pennsylvania, (1925) N. B. M. Ex., (1937) North Carolina
University of Pittsburgh School of Medicine		(1931)	N. B. M. Ex.
Woman's Medical College of Pennsylavnia		(1936)	Illinois
University of Tennessee College of Medicine		(1937)	Tennessee
University of Texas School of Medicine		(1937)	Texas
University of Vermont College of Medicine		(1935)	Vermont
Medical College of Virginia		(1938)	Virginia
University of Virginia Department of Medicine		(1929)	N. B. M. Ex.
Dalhousie University Faculty of Medicine		(1933)	New York

Queen's University Faculty of Medicine	(1932)	W. Virginia
University of Toronto Faculty of Medicine	(1936)	New York
McGill University Faculty of Medicine	(1935)	N. B. M. Ex.
University of Montreal Faculty of Medicine	(1928)	Mass.
Medizinische Fakultät der Universität Wien	(1910), (1923), (1927), (1932)	New York
Friedrich-Wilhelms-Universität Medizinische Fakultät, Berlin	(1899), (1932)*	New York, (1931) Maryland
Julius-Maximilians-Universität Medizinische Fakultät, Würzburg	(1925)	Iowa
Kaiser-Wilhelms-Universität Medizinische Fakultät, Strassburg	(1906)	New York
Ludwigs-Maximilians-Universität Medizinische Fakultät, München	(1898), (1914), (1936)	New York
National University of Athens School of Medicine	(1892)	Mass.
Magyar Királyi Erzsébet Tudományegyetem Orvostudományi, Pecs	(1928)	New York
Regia Università di Napoli Facoltà di Medicina e Chirurgia	(1891)	Penna.
Regia Università degli Studi di Roma. Facoltà di Medicina e Chirurgia	(1935)	Maine
Uniwersytet Stefana Batorego Wydzial Lekarski, Wilno	(1936)	New York
Licentiate of the Royal College of Physicians, of the Royal College of Surgeons of Edinburgh and of the Royal Faculty of Physicians and Surgeons of Glasgow	(1936) N. B. M. Ex., (1935), (1938, 3)	New York
Universität Bern Medizinische Fakultät	(1935), (1936, 2)	New York

* License has not been issued.

Book Notices

Diverticula and Diverticulitis of the Intestine: Their Pathology, Diagnosis, and Treatment. By Harold C. Edwards, M.S., F.R.C.S., Surgeon and Lecturer in Surgery to King's College Hospital, London. With foreword by Gordon Gordon-Taylor, O.B.E., M.S., F.R.C.S. Cloth. Price, $8. Pp. 335, with 223 illustrations. Baltimore: William Wood & Company, 1939.

This constitutes an achievement in writing, in original observation and in scientific manner of description. It is in substance the Jacksonian Prize Essay of the Royal College of Surgeons for the year 1932, revised and brought down to date. It reminds one of the rare and comprehensive thèses de Paris of earlier years, in which a subject was approached with an original point of view, expanded and propounded and exhaustively portrayed. The author, a surgeon of ability and experience, has the capacity of combining an abundant understanding of the physiology of the bowel with a good sense of pathology. In addition, his medical point of view is at all times one of common sense and good judgment, devoid of fixed opinions, flexible and open, which, combined with surgical experience, makes for a rounded whole.

As regards the etiology of intestinal diverticula, the author leans heavily on the acquired rather than the congenital origin. One wonders whether this aspect is not at times overplayed and the congenital phase, particularly as regards the duodenum, not sufficiently stressed. Throughout, the developmental weakness of the bowel at the point of entrance of the vessel, plus the pulsion force of increased intraluminal pressure, explain all diverticula with but few exceptions. Thus the combination of pathology with the most recent physiologic advances explains the phenomena of diverticulosis, to the neglect of the congenital factors. The chapter on Meckel's diverticulum is excellent; peptic ulceration within the diverticulum is admirably described. It is noticeable that the radiographic description of peptic ulcer in Meckel's diverticulum is not mentioned. One might disagree with the inclusion of duodenal diverticula in the first portion of the duodenum as a consequence of ulcer at this site. These outpouchings of the lateral walls as a result of continuous ulcer spasm so rarely develop into anything resembling true diverticula that they constitute points of pathologic interest rather than diverticula of clinical significance. The chapters on the recurrence and formation of diverticula of the jejunum and ileum are lucid and clear. The illustrations and particularly the colored plates are so well executed and the text is so direct that one reads with interest and understands clearly what might otherwise be a difficult subject. The roentgenograms here as well as throughout the book are excellently reproduced, as are the photomicrographs of the intestinal wall.

In diverticulosis of the colon, the author expresses a definite preference for the barium sulfate enema over the barium sulfate meal for its demonstration. One can agree heartily with this choice. The use of "dual exposure" pictures is advocated and logically expounded. This method is probably unfamiliar to American readers and deserves attention. In fact, the entire chapter on radiography of colonic diverticula calls for close reading, as it is replete with original thought and observation. It is a relief finally to read that carcinoma of the colon and diverticulosis are not pathologically associated but are merely coexistent and unrelated. This is today the more recent view and should help finally to lay the ghost of carcinoma ex diverticula. The approach to the treatment of diverticulitis is moderate and conservative. The use of lavage and irrigation is reasonable, accepted and advocated. Nowhere is the abrupt surgical attack pushed and overstated. When surgery is advocated, it is well described as regards both indications and actual surgical technic; moderation and limited procedures rather than overmeddlesome resections are employed.

A good readable text, unusually good illustrations, references widely distributed in world literature, always ample but never overabundant so as to constitute a nuisance, a modern physiologic point of view and a remarkably balanced and controlled judgment on medical and surgical therapy make this volume one of interest and of great value.

Human Helminthology: A Manual for Physicians, Sanitarians and Medical Zoölogists. By Ernest Carroll Faust, A.B., M.A., Ph.D., Professor of Parasitology and Director of Laboratories, Department of Tropical Medicine, Tulane University of Louisiana, New Orleans, Louisiana. Second edition. Cloth. Price, $8.50. Pp. 780, with 302 illustrations. Philadelphia: Lea & Febiger, 1939.

New data in biologic and clinical lines published since the appearance of the first edition in 1929 have been incorporated in all important chapters and an entirely new chapter on anthelmintics and their use has been added. This supplemental material has added 164 pages to an already extensive work. The new chapter will greatly enhance the usefulness of the work for physicians, since it critically summarizes the existing clinical evaluations of santonin, oil of chenopodium, thymol, carbon tetrachloride, tetrachlorethylene, hexylresorcinol (caprokol), beta-naphthol, medicinal gentian violet, pelletierin, Dryopteris filix-mas, areca, kousso, pumpkin seed, kamala, quassia, coconut, antimony compounds and emetine hydrochloride. In each case the nature of the drug is given and its use, its effectiveness as an anthelmintic, dosages, administration, toxicity and uses as a specific for various helminths are reported in detail. Contraindications for each important drug are reported. Accurate diagnosis of the helminth infection is stressed and specific therapy recommended for the reason that, although a single anthelmintic may be effective against several species of parasites, nevertheless there is no one drug useful as a general anthelmintic and rarely is any one equally efficient against even two different species.

This manual is a mine of information in an oft neglected field and is an indispensable addition to the library of every biologist and physician.

Medizinische Praxis: Sammlung für ärztliche Fortbildung. Herausgegeben von Prof. Dr. L. R. Grote, Direktor der Medizinischen Klinik des Rudolf-Hess-Krankenhauses Dresden, Prof. Dr. A. Fromme, Direktor der Chirurgischen Abteilung des Stadtkrankenhauses Dresden-Friedrichstadt, Prof. Dr. K. Warnekros, Direktor der Staatlichen Frauenklinik zu Dresden, und Prof. Dr. F. Lange, Direktor der Medizinischen Klinik des Stadtkrankenhauses Dresden-Friedrichstadt. Band XXVIII: Die Faeces des Menschen: Funktionelle Diagnostik der Darmkrankheiten, Physiologie und Pathophysiologie der Verdauungsvorgänge. Von Professor Dr. med. W. Heupke, Oberarzt der Medizin. Univ. Poliklinik Frankfurt a. M. Paper. Price, 9 marks. Pp. 115, with 59 illustrations. Dresden & Leipzig: Theodor Steinkopff, 1939.

This monograph contains fifty-five black and white illustrations and four colored plates, the former representing organisms found in the feces of human beings and methods of study of them, the latter the appearance of substances observed in stools of individuals suffering from various digestive disturbances. The purpose of the book is said to be a gathering of information for use in actual medical practice. It is emphasized that it is required of a physician that he present the best of his knowledge to the people of his own country. The book has ten chapters. Chapter I concerns itself with a discussion of digestion in various intestinal segments. In chapter II the

general character of a stool study is discussed with emphasis on the ova of worms, occult blood and methods of examination. A macroscopic study of stools is detailed in chapter III. Emphasis is laid on weight, mixture, consistency, form and color of stools and the presence of mucus, pus and food residue. The technic of examination is described. Most emphasis is extended to the microscopic study of stools and the longest chapter, chapter IV, is devoted to this subject Technic of study is explained, microscopic reactions are described and substances to be looked for are enumerated and described. These substances, according to the author, include muscle and elastic fibers, fats, starch, cellulose, crystals, mucus, leukocytes, erythrocytes, epithelial débris and other food residue. Chapter V is devoted to the diagnosis of maladies caused by worms, with ample illustrations. In chapter VI a bacteriologic study of stools is detailed. Reference is made particularly to the bacterial flora present in non-disease states. It is said that from one fourth to one third of the dry matter of stools consists of bacteria and that the average adult person casts off eighty-five billion bacteria daily. Chapter VII is devoted to the study of protozoa. Only five pages, including nine illustrations, is devoted to this. Chemical analysis of the stool is described in chapter VIII. The significance of acid and alkaline reactions is discussed and analysis for occult blood, bile, albumin and ferments is outlined. Chapter IX is devoted to a discussion of quantitative analysis of stools for fat and other food residue. In chapter X the significance of the aforementioned studies is described as it relates to various disease processes: sprue, pancreatic disease, various types of dyspepsia, enterocolitis and nervous diarrhea. One short paragraph is devoted to the conditions found in the presence of cancer. The author's discussion of the material at hand is excellent. As an aid to actual medical practice the book seems to fall short in its failure to report valuable knowledge of bacteria and other constituents of discharges of the bowels in inflammatory disease processes and in its failure to add to existing knowledge.

Biological Oxidation. By Carl Oppenheimer, M.D., Ph.D., and Kurt G. Stern, Ph.D. With the collaboration of W. Roman, Ph.D. Cloth. Price, $8.25. Pp. 317, with 17 illustrations. New York: Nordemann Publishing Company, Inc.; The Hague: Dr. W. Junk, 1939.

This volume represents an amplification of the chapter on biologic oxidations in Oppenheimer's more general work on enzymes. There has been a need for a comprehensive theoretical treatment of this subject and the volume under review meets a part of that need. The historical method of development of the subject is used, which leads to some confusion in presentation. Some confusion results from developing the subject in terms of the Wieland-Warburg argument. That controversy is now a matter of history and a straightforward presentation of theory with supporting facts would be more intelligible to the serious beginning student. On the whole, however, the theory is presented in fundamental terms and can be followed by any one who has a moderately good background in modern physical chemistry. The book is written as a guide for beginning investigators in the field and as a critical digest of existing information for others. There are 1,383 references to the significant literature. Typographical and grammatical errors are regrettably numerous, sometimes as many as two to a page. "Octet" is consistently misspelled.

Go Down, Death! A Story of Facts and Figures. By M. C. Igloe, M.D., Director of the Mecosta-Osceola Health Department, Big Rapids, Michigan. Paper. Pp. 46. Big Rapids, Michigan, 1939.

This mimeographed spiral-bound document is an interesting effort to do for the health officer's annual report of Mecosta-Osceola counties, Mich., what Robert Benchley did for the "Treasurer's Report, and Other Forms of Community Singing." Dr. Igloe, with a sure sense of what will make people read things they ought to read but usually will not, starts out with a list of persons important to public health work in his territory, the state of Michigan, and the nation. Then he proceeds to beguile his readers with titles which tell little but promise much. "Robert Manton Makes a Discovery" is the heading of chapter I, dealing with the discovery by a citizen that a health department exists in the community and that it can do something about typhoid. "They Were Once Considered Stupid" introduces the subject of health examinations of school children, and the necessary corrections, appropriately assigned to the family doctor. "You're Twenty-Five Years Too Late" tells about expectant mothers and what modern medicine, with the cooperation of health departments, can do for them. "Swell, Then I Don't Have to Marry the Girl" is the approach to the syphilis problem and premarital examination. "Thank God for Lipstick" tells about restaurant sanitation, dish washing and inspection. "Scarcely Anybody Ever Died" is aimed at the arguments of the old timers who think that public health work is an unnecessary frill and a needless expense. "Trials and Tribulations" is a lament about the small share contributed locally for local public health work, plus some timely remarks on the obligations of health departments to be as local as possible and to let medical treatment alone. "Haves vs. Have-Nots" is neither political nor economic but epidemiologic and serologic, treating of persons with communicable diseases, carriers, immunes, contacts and epidemics. "A Collector of Garbage Cans" is the all too realistic discussion of infected mouths and decaying teeth. "Go-Down, Death," the last and titular chapter, named from a Negro spiritual quoted from "God's Trombones" by James Weldon Johnson (Viking Press, 1927) is a summary and conclusion, with appropriate references to two health awards earned by the two-county health department in the rural contests by the Chamber of Commerce of the United States. Practical souls who must have their statistics will find them, succinctly and graphically presented, in the appendix, where the casual reader can take them or let them alone. After reading the rest of the report, it is more likely that he will take them. This is a refreshing and interesting example of how annual reports, which are too often dull and dreary obligations, can actually be made stimulating and entertaining.

Aetiologie und Pathogenese der Ekzemkrankheiten: Klinische Studien über die Ursachen der Ekzeme unter besonderer Berücksichtigung des diagnostischen Wertes der Ekzemproben. Von Poul Bonnevie, Dr. med., Oberarzt der Hautklinik des Finseninstituts zu Kopenhagen. Paper. Price, 18 marks. Pp. 592, with 65 illustrations. Kopenhagen: NYT Nordisk Forlag Arnold Busck; Leipzig: Johann Ambrosius Barth, 1939

This excellent work is a clinical study of the cause of eczema, with especial consideration of the diagnostic value of the tests in eczema, and was done with the view of throwing light on therapy, prophylaxis and medical opinion as it pertains to insurance matters in eczema. The author, who is chief of the skin clinic of the Finsen Institute at Copenhagen and an expert on public works and factory inspection, states that this motive was the special basis of his investigation, as well as his experience, which on the whole coincides with the studies of others on the knowledge of those cases of eczema which are associated with idiosyncrasy and in which definite proof of allergy is demonstrated. He further states that after securing positive diagnostic tests it is necessary to prove their value in eczema. The author outlines his material as (1) the eczema group (restriction and separation of the eczema group; description and types of eczema); (2) idiosyncratic eczema (primary epidermal irritability); (3) mycotic eczema (known as trichophytids; epidermophytids); (4) constitutional prurigo eczema, and (5) pathogenesis of eczema (primary cutaneous anaphylaxis eczema). The material was collected for the purpose of bringing greater clarity to the problem of the etiology and pathogenesis of the customary cutaneous diseases that are grouped under the name eczema. The author feels that as a result of his observations there is possibly a historical isolation of other disease pictures that have been previously included under eczema and in which idiosyncratic phenomena assume a more or less special role. The clinical idea of idiosyncrasy has in recent years been bound together with general pathologic and immunobiologic processes and has therefore found a place in studies on allergy. A critical evaluation of this view as well as a consideration and evaluation of the eczematous diseases on the same basic theories naturally fits in the scope of this treatise and the whole subject is discussed in a profound manner, making the book a difficult one to review. This work will find a desirable place in the library of those interested in the problem of eczema from the allergic or cutaneous point of view.

Bureau of Legal Medicine and Legislation

MEDICOLEGAL ABSTRACTS

Chiropractic Practice Acts: Amendment of Complaint in Revocation Proceedings; Unprofessional Conduct Defined.—A licensed chiropractor was convicted on an information charging her with "six unrelated petit larcenies." The Supreme Court of Colorado reversed the conviction on the ground that the information charged the commission of several different crimes. Thereafter the board of chiropractic examiners revoked the chiropractor's license, the proceedings being based on the commission of two of the six larcenies that were involved in the criminal case. The district court upheld the board and the chiropractor appealed to the Supreme Court of Colorado.

The Colorado board of chiropractic examiners may suspend or revoke a license for, among other causes, the conviction of a crime involving moral turpitude or for "unprofessional, dishonorable or immoral conduct." Charges must be presented to the board under oath; the accused must be furnished with a copy of the charges at least thirty days before the hearing, and the accused must be given a chance to be heard. The original complaint in this case charged the commission of the two petit larcenies. At the hearing, after the complaint was assailed as insufficient, the board permitted an assistant attorney general to amend the complaint by adding an allegation that in the commission of the acts charged the chiropractor was guilty of unprofessional, dishonorable and immoral conduct. Thereafter the license was revoked. The complaint, as originally filed, obviously did not set forth any of the grounds for which a license may be revoked or suspended. The chiropractic act specifies that the conviction, not the commission, of certain offenses shall be ground for discipline. When the board permitted the assistant attorney general to amend the complaint at the hearing, the court said, it manifestly attempted to validate a defective complaint by using language that presented another ground not theretofore mentioned. Furthermore, the only duty of the attorney general, under the chiropractic act, was "to advise the board upon all legal matters and to represent the board in all actions brought by or against it." He was in no sense the complainant or prosecutor and did not ex officio supplant the one who filed charges. The amendment was not supported by the required oath, either of the original complainant or of anybody else. The board therefore had no right to consider it in the hearing.

Even if the board had jurisdiction, continued the Supreme Court, the revocation order could not be sustained. The complaint did not charge any unprofessional, dishonorable or immoral conduct within the meaning of the act. The commission of the two misdemeanors on which the complaint was based had no connection with the practice of chiropractic and therefore constituted no ground for disciplinary action. The "unprofessional, dishonorable or immoral conduct" referred to in the act would include such practices as malpractice, false representation by public advertisement or otherwise of inevitable cure by chiropractic, gross personal immorality clearly objectionable in common social or professional intercourse, or misrepresentations or misdeeds directly connected with the practice of chiropractic.

The criminal prosecution of the chiropractor failed because it constituted an attempt to join six alleged offenses entirely independent of one another. The board subsequently undertook to function as a substitute tribunal by entertaining a complaint that had the same weaknesses as the criminal information. If such an omnibus proceeding, the court observed, is an unwholesome deviation from recognized procedure in the regular course of criminal jurisdiction, then all the more is it to be avoided when the hearing is before a lay tribunal. While the board undertook to try the chiropractor on only two of the original six charges of petit larceny, it admitted evidence of all six charges. This was clearly improper and erroneous.

Finally, said the court, the board imposed on the chiropractor the extreme penalty, namely, the revocation of her license, thus depriving her of her means of livelihood. Had she been lawfully convicted in the criminal case of the two larcenies involved in the revocation proceeding, the maximum penalty would have been imprisonment in the county jail for not more than sixty days and/or a fine of not more than $100. Yet the board undertook to deprive her of her life profession. Such severity constituted, in the opinion of the court, an abuse of discretion.

The Supreme Court therefore directed the lower court to command the board to restore the chiropractor's license.—*Hummel v. Board of Chiropractic Examiners of Colorado (Colo.), 87 P. (2d) 248.*

Malpractice: Chiropractic Treatment of Hemorrhoids.—The defendant Mims was a licensed chiropractor in LaGrange, Ga., although, the plaintiff charged, he professed to practice surgery and to administer medicine and held himself out to the public as a doctor. Mims advertised to remove hemorrhoids in a painless, bloodless and drugless manner, and when the plaintiff applied to him for treatment he guaranteed a cure. According to the plaintiff's complaint, however, Mims did not treat him in a painless, bloodless and drugless manner but made injections of a medicine of some kind with a hypodermic needle and performed a cutting operation with an unsterilized safety razor blade, without exercising reasonable care and skill to prevent infection. Hemorrhages followed the operation and the plaintiff was forced to call in a physician. The plaintiff suffered intense pain, he claimed, because of Mims' failure to exercise a reasonable degree of care and skill in performing the operation, and abscesses developed because Mims did not use properly sterilized instruments, and the plaintiff was, he claimed, permanently and totally disabled for work at any hard labor. In the city court of LaGrange judgment was rendered for the plaintiff. The defendant chiropractor thereupon moved for a new trial, and when his motion was overruled he appealed to the court of appeals of Georgia, division No. 2.

There was testimony, said the court of appeals, that the defendant used an unsterilized safety razor blade in operating on the plaintiff and that he gave the plaintiff a number of injections. Although these charges were denied by the defendant, the evidence was sufficient, said the court, to authorize the verdict. The defendant, contended, however, that it was error for the trial court to charge the jury, in accordance with the Georgia Code, section 84-924, that:

> A person professing to practice surgery or the administering of medicines for compensation must bring to the exercise of his profession a reasonable degree of care and skill. Any injury resulting from a want of such care and skill shall be a tort for which a recovery may be had.

The standard set by the code, the defendant contended, does not apply to a chiropractor, as the evidence showed that chiropractors do not administer medicine or perform surgical operations. A chiropractor would be liable, the defendant contended, only for failure to apply the degree of care and skill required by the established practice of chiropractors. In a case in which a chiropractor confined himself within the limits of his profession, said the court of appeals, this objection might be meritorious, but it could not be said that it was error to give this instruction in a case in which there was testimony to the effect that the chiropractor had exceeded those limits by administering an injection or a number of injections and by performing a surgical operation with a safety razor blade. Moreover, the trial court charged that a person within the purview of the section of the code quoted must exercise such a reasonable degree of care and skill as under similar conditions and like surrounding circumstances is ordinarily employed by a person engaged in the same general line of practice. The charge given by the trial court was not error.

The defendant complained that the trial court failed to charge the jury (1) that it could not set up a standard of its own as to what constituted ordinary care, (2) that it must be guided solely by the testimony of those engaged in chiropractic practice and (3) that if it was unable to determine from the testimony of chiropractors what constituted ordinary care and skill there would be a failure of proof as to the only standard on which the jury could rely, and the evidence would be insufficient to sustain the plaintiff's case. Such a proposed charge, said the court of appeals, was not good law. The jury is always the judge of what constitutes ordinary care and what constitutes negligence, and they are not confined to chiropractic testimony in determining the question. There might be a custom or course

of practice among chiropractors which medical experts would condemn, and certainly such evidence could not be excluded from consideration by the jury.

The judgment of the court below was affirmed.—*Mims v. Ragland (Ga.), 2 S. E. (2d) 174.*

Hospitals: Liability When Profits Are Devoted to Charitable Purposes.—The plaintiff, a woman over 70 years of age, was admitted to the defendant hospital as a pay patient. Several days after her admission she fell out of bed, and one of the attending physicians gave instructions that the bed be equipped with a side board. This precautionary procedure was thereafter utilized except on one occasion, at which time the plaintiff again fell out of bed and fractured her right hip. She sued the hospital and obtained a judgment in the trial court from which the hospital appealed to the district court of appeal, first district, division 1, California, contending that it was a charitable institution and as such exempt from liability.

The evidence showed that the defendant hospital was built from private funds secured through a loan. It received no endowments or donations and its income was derived solely from patients. There were no stockholders and its officers served without remuneration. It accepted charity, semicharity and full pay patients. A free clinic for children and expectant mothers was maintained, and a free school for training nurses was operated. It gave "dole at its doors," free meals to indigent applicants and assistance to poor families outside of the hospital. The articles of incorporation provided that "Pecuniary profit is not and never shall be the object of this corporation," but in the paragraph outlining the purpose of the corporation no mention was made of charity. The trial court found that the hospital "was operated by said defendant for profit even though the general purposes of said defendant may have been charitable."

In California, said the district court of appeal, the rule is well settled that where one accepts the benefit of a public or of a private charity he impliedly exempts the benefactor from liability for the negligence of servants in administering the charity. The reason for the rule is public policy. If the organization and the method of operation are strictly nonprofitable, and the fundamental purpose is charity, the public is best served by the rule that exempts from liability the proceeds from donations and trust funds that aim to aid the sick and afflicted, who would be unable otherwise to obtain the advanced scientific care and treatment. Where a charity hospital is operated at a loss, the court continued, and the deficit is met by resort to the proceeds of trust funds and donations, the law, in the interest of protecting the many as against the few, assumes that entry into such an institution constitutes a waiver by the patient of rights for damages resulting from injuries occurring from the negligence of its servants when due care has been used in the selection of the servants. If the hospital is not dependent on gifts and donations for its usual upkeep, the waiver does not apply unless the patient is the recipient of charitable benefits, in which instance it would be against sound morals to sue the benefactor. The court noted a distinction between torts of charitable institutions committed in the direct administration of the charity and torts committed in deriving funds wherewith to operate the charity. In the latter instance, the court said, the hospital is liable.

In the present case, the court continued, a loan was negotiated for the construction of the hospital, and it was maintained from profits derived from the operation of the pay-patient department. The hospital was not endowed but created its own funds for charity. There was, therefore, no possibility of a trust fund, donated as charity for many of the sick and afflicted, being diverted or depleted by an award of damages to one person. The defendant hospital was a good business enterprise, the court thought. The primary purpose of it was profit, even though that profit was devoted to charity. When the plaintiff was admitted to the hospital she was ignorant of any claim that it was exempt from liability for its negligence on the theory that it was a charitable institution. She was charged full rates for care, pharmaceutical supplies and all services rendered. Except in the one instance of negligence, she received all the advantages and all the benefits given to any patient who might have paid full rates in any hospital not claiming charitable exemption. Considering all the facts of the case, the court could find no justification for exempting the defendant hospital from the liability incurred by other hospitals conducted for profit.

The judgment in favor of the plaintiff was therefore affirmed. —*Silva v. Providence Hospital of Oakland (Calif.), 87 P. (2d) 374.*

Society Proceedings

COMING MEETINGS

Academy of Physical Medicine, Richmond, Va., Apr. 24-26. Dr. Herman A. Osgood, 144 Commonwealth Ave., Boston, Secretary.
Alabama, Medical Association of the State of, Birmingham, Apr. 16-18. Dr. D. L. Cannon, 519 Dexter Ave., Montgomery, Secretary.
American Association for the Study of Goiter, Rochester, Minn., Apr. 15-17. Dr. W. Blair Mosser, 133 Biddle St., Kane, Pa., Secretary.
American Association for the Study of Neoplastic Diseases, Louisville, Ky., Apr. 11-13. Dr. Eugene R. Whitmore, 2139 Wyoming Ave. N.W., Washington, D. C., Secretary.
American Association of the History of Medicine, Atlantic City, N. J., May 4-5. Dr. Henry E. Sigerist, 1900 East Monument St., Baltimore, Secretary.
American Association on Mental Deficiency, Atlantic City, May 22-26. Dr. E. Arthur Whitney, Washington Road, Elwyn, Pa., Secretary.
American Laryngological Association, Rye, N. Y., May 27-29. Dr. C. J. Imperatori, 108 East 38th St., New York, Secretary.
American Orthopedic Association, Kansas City, Mo., May 6-9. Dr. Ralph K. Ghormley, 110 Second Ave. S.W., Rochester, Minn. Secretary.
American Otological Society, Rye, N. Y., May 30-31. Dr. Isidore Friesner, 36 East 73d St., New York, Secretary Pro-Tem.
American Pediatric Society, Skytop, Pa., May 2-4. Dr. Hugh McCulloch, 325 North Euclid Ave., St. Louis, Secretary.
American Psychiatric Association, Cincinnati, May 20-24. Dr. Arthur H. Ruggles, 305 Blackstone Blvd., Providence, R. I., Secretary.
American Society for Clinical Investigation, Atlantic City, N. J., May 1. Dr. Eugene M. Landis, 3400 Spruce St., Philadelphia, Secretary.
American Society of Biological Chemists, New Orleans, Apr. 13-17. Dr. C. G. King, Dept. of Chemistry, Univ. of Pittsburgh, Pittsburgh, Secretary.
American Surgical Association, St. Louis, May 1-3. Dr. Charles G. Mixter, 319 Longwood Ave., Boston, Secretary.
Arizona State Medical Association, Tucson, Apr. 18-20. Dr. Leslie R. Kober, 15 East Monroe St., Phoenix, Secretary.
Arkansas Medical Society, Fort Smith, Apr. 15-17. Dr. W. R. Brooksher, 602 Garrison Ave., Fort Smith, Secretary.
Association of American Physicians, Atlantic City, N. J., May 7-8. Dr. Hugh J. Morgan, Vanderbilt University Hospital, Nashville, Tenn., Secretary.
California Medical Association, Coronado, May 6-9. Dr. George H. Kress, 450 Sutter St., San Francisco, Secretary.
Connecticut State Medical Society, Hartford, May 22-23. Dr. Creighton Barker, 258 Church St., New Haven, Secretary.
Florida Medical Association, Tampa, Apr. 29-May 1. Dr. Shaler Richardson, 111 West Adams St., Jacksonville, Secretary.
Georgia, Medical Association of, Savannah, Apr. 23-26. Dr. Edgar D. Shanks, 478 Peachtree St. N.E., Atlanta, Secretary.
Illinois State Medical Society, Peoria, May 21-23. Dr. Harold M. Camp, 224 South Main St., Monmouth, Secretary.
Iowa State Medical Society, Des Moines, May 1-3. Dr. R. L. Parker, 3510 Sixth Ave., Des Moines, Secretary.
Kansas Medical Society, Wichita, May 15-16. Mr. Clarence G. Munns, 112 West Sixth St., Topeka, Executive Secretary.
Louisiana State Medical Society, New Orleans, Apr. 22-24. Dr. P. T. Talbot, 1430 Tulane Ave., New Orleans, Secretary.
Maryland, Medical and Chirurgical Faculty of, Baltimore, Apr. 23-24. Dr. Richard T. Shackelford, 1211 Cathedral St., Baltimore, Secretary.
Massachusetts Medical Society, Boston, May 21-22. Dr. Alexander S. Begg, 8 Fenway, Boston, Secretary.
Minnesota State Medical Association, Rochester, Apr. 22-24. Dr. B. B. Souster, 493 Lowry Medical Arts Building, St. Paul, Secretary.
Mississippi State Medical Association, Jackson, May 14-16. Dr. T. M. Dye, McWilliams Bldg., Clarksdale, Secretary.
Missouri State Medical Association, Joplin, Apr. 30-May 1. Mr. E. H. Bartelsmeyer, 634 North Grand Blvd., St. Louis, Executive Secretary.
Nebraska State Medical Association, Omaha, Apr. 22-25. Dr. R. B. Adams, 416 Federal Securities Building, Lincoln, Secretary.
New Hampshire Medical Society, Manchester, May 14-15. Dr. Carleton R. Metcalf, 5 South State St., Concord, Secretary.
New Mexico Medical Society, Albuquerque, May 27-29. Dr. L. B. Cohenour, 219 West Central Ave., Albuquerque, Secretary.
New York, Medical Society of the State of, New York, May 6-9. Dr. Peter Irving, 2 East 103d St., New York, Secretary.
New York State Association of Public Health Laboratories, Rochester, May 20. Miss Mary B. Kirkbride, New Scotland Ave., Albany, Secretary.
North Carolina, Medical Society of the State of, Pinehurst, May 13-15. Dr. T. W. M. Long, 321 Hamilton St., Roanoke Rapids, Secretary.
North Dakota State Medical Association, Minot, May 6-8. Dr. Albert W. Skelsey, 20½ North Broadway, Fargo, Secretary.
Northern Tri-State Medical Association, Battle Creek, Mich., Apr. 9. Dr. E. Benjamin Gillette, 320 Michigan St., Toledo, Ohio, Secretary.
Ohio State Medical Association, Cincinnati, May 14-16. Mr. C. S. Nelson, 79 East State St., Columbus, Executive Secretary.
Oklahoma State Medical Association, Tulsa, May 6-8. Dr. L. S. Willour, 210 Plaza Court Bldg., Oklahoma City, Secretary.
Society for the Study of Asthma and Allied Conditions, Atlantic City, N. J., May 4. Dr. W. C. Spain, 116 East 53d St., New York, Secretary.
South Carolina Medical Association, Charleston, Apr. 30-May 2. Dr. E. A. Hines, Seneca, Secretary.
South Dakota State Medical Association, Watertown, May 20-22. Dr. Clarence E. Sherwood, Madison, Secretary.
Tennessee State Medical Association, Chattanooga, Apr. 9-11. Dr. H. H. Shoulders, 706 Church St., Nashville, Secretary.
Texas, State Medical Association of, Dallas, May 13-16. Dr. Holman Taylor, 1404 West El Paso St., Fort Worth, Secretary.

Current Medical Literature

AMERICAN

The Association library lends periodicals to members of the Association and to individual subscribers in continental United States and Canada for a period of three days. Three journals may be borrowed at a time. Periodicals are available from 1930 to date. Requests for issues of earlier date cannot be filled. Requests should be accompanied by stamps to cover postage (6 cents if one and 18 cents if three periodicals are requested). Periodicals published by the American Medical Association are not available for lending but can be supplied on purchase order. Reprints as a rule are the property of authors and can be obtained for permanent possession only from them.

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American Journal of Cancer, New York

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Extragenital Chorionepithelioma: Report of Case. L. Berman, Minneapolis.—p. 23.
Observations on Injection of Human Wart (Verruca Vulgaris) Extracts into Rabbits with Benzpyrene Papillomas on Ear. A. Brunschwig, D. Tschetter and Anna Hamann, Chicago.—p. 50.
Retroperitoneal Fibrosarcoma: Report of Eight Cases. W. L. McNamara, H. D. Smith and C. S. Boswell, Los Angeles.—p. 63.
*Primary Fibromyoma of Breast: Report of Case and Review of Literature. R. J. Lebowich and G. Lenz, Gloversville, N. Y.—p. 73.
Does Cholesterol Stimulate Tumor Development? C. A. Baumann, H. P. Rusch, B. E. Kline and H. P. Jacobi, Madison, Wis.—p. 76.
Chemotherapy in Experimental Cancer: I. Attempts to Produce Intratumoral Clotting by Combined Action of Lead and Thrombogenic Agents. W. A. Selle, F. Paquin and P. Brindley, Galveston, Texas.—p. 86.
*Crude Wheat Germ Oil as Factor of Tumor Formation in Rats. L. L. Ginzton and C. L. Connor, San Francisco.—p. 90.
Lipid Composition of Intracranial Tumors. L. O. Randall, Rochester, N. Y.—p. 92.
Determination of Serum "Acid" Phosphatase Activity in Differentiating Skeletal Metastases Secondary to Prostatic Carcinoma from Paget's Disease of Bone. A. B. Gutman, Ethel Benedict Gutman and J. N. Robinson, New York.—p. 103.
Rabbit Test for Malignancy. J. Gershon-Cohen, M. Samson and H. Shay, Philadelphia.—p. 109.

Primary Fibromyoma of Breast.—Lebowich and Lenz report, in a woman aged 58, the fourth case of fibromyoma of the breast arising from the parenchyma and independently of the nipple. Like other fibromyomas of this type, the tumor was painless in contrast to those originating in the nipple. The origin of the growth could not be determined with certainty. From the morphology of the tumor cells and their products, the number of mitotic figures and the absence of tissue infiltration or invasion of blood vessels and lymphatics the tumor is considered benign.

Wheat Germ Oil and Tumor Formation.—Ginzton and Connor found no tumors in two groups of rats fed crude wheat germ oil in large amounts over a period of ten months, nor did they observe any tumors produced in ten rats fed a diet the bulk of which consisted of wheat germ. Vitamin E and vitamin B complex, which are abundant in wheat germ oil and wheat germ respectively, apparently produce no changes in rats when fed in excessive amounts.

American Journal of Physiology, Baltimore

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Sympathetic Action in Accommodation for Far Vision. M. W. Morgan Jr., J. M. D. Olmsted and W. G. Watrous, Berkeley, Calif.—p. 588.

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*Thoracoplasty in Older Patients. R. H. Overholt, Brookline, Mass.—p. 143.
Extrapleural Pneumothorax and Oleothorax: Their Management. J. R. Paxton, A. S. Churchill and Jane Skillen, Olive View, Calif.—p. 163.
*Rate of Conversion of Sputum During Pneumothorax Treatment. R. A. Bendove, H. Alexander, M. D. Deren and S. Lipstein, New York.—p. 177.
Tuberculosis in the Negro: Clinical and Roentgenologic Characteristics. H. L. Israel and H. M. Payne, Philadelphia.—p. 188.
*Tuberculosis in the Aged: Statistical Study. E. R. Wiese, White Haven, Pa.—p. 210.
Tuberculosis of Spine: Clinical Study of 203 Patients from Sea View and St. Luke's Hospital. M. Cleveland, New York.—p. 215.
Tuberculosis Control: Interpreting Its Modern Methods to the Public from the Official Point of View. H. F. Vaughan, Detroit.—p. 232.
Id.: Interpreting Its Modern Methods to the Public from the Nonofficial Point of View. Katherine Z. W. Whipple, New York.—p. 237.
Federal and State Programs of Vocational Rehabilitation. T. Copp, Washington, D. C.—p. 246.
Tuberculosis Studies in Tennessee: Results Obtained from Serial Examinations of Sputum. R. L. Gauld and W. C. Williams, Nashville, Tenn.—p. 257.

Thoracoplasty in Older Patients.—Overholt feels that on theoretical grounds many older tuberculous patients should respond favorably to permanent collapse of the diseased portion of the lung. The author gives the results of thoracoplasty obtained with 162 consecutive tuberculous patients between 40 and 65 years of age. The operations were performed between November 1931 and May 1939. The 162 patients represent 24 per cent of all patients treated by thoracoplasty within this period. Patients with bilateral involvement and with serious complications, such as fever, progression of infiltrative lesions, empyema, extrapleural tuberculosis and nontuberculous complications (heart disease, diabetes) were operated on. Extensive destruction of pulmonary tissue has left the older patient with uninvolved portions of lung too small in volume to fill the thorax. A carefully graded and selective thoracoplasty reduces the volume of the thoracic cage so that its volume is not excessive for the remaining healthy portion of lung. The alteration in the position of the thoracic wall not only permits relaxation of fibrous tissue and cavity closure but in many cases readjusts the position of the remaining healthy portion of the lung and the heart so that their function is improved. The operative and early mortality (within the first three months) rate in this series was 6.8 per cent. The late mortality, due to tuberculous disease, was 4 per cent. Permanent collapse benefited 84 per cent of cases followed from six to ninety months. Fifty-two of the patients returned to work. The positive sputums of 87 per cent of the patients were converted. The operation was supplemented by lung mobilization in ninety-nine patients, the average number of stages was 2.1, thirty-one patients required but one operation and partial thoracoplasty; seven ribs or less was sufficient for ninety-seven patients. Patients who have reached the later decades of life should not be denied the benefits of permanent collapse therapy on the grounds of age alone.

Conversion of Sputum During Pneumothorax Treatment.—Bendove and his associates determined the time interval between therapeutic pneumothorax and the conversion of positive sputum. The study is based on the observations of 546 of 1,320 Sea View Hospital patients whose sputums became negative, and of 165 of 275 private patients. The patients of the last group were confined to bed in a hospital or at home for only the first few treatments; all subsequent insufflations were continued while the patients were ambulatory. Only those cases which were persistently negative for six months are included in the study. The rate of conversion of sputum by months after the induction of pneumothorax shows that the highest number of cases become negative in the early months of the treatment. From the fourth month on there is a steady decline with few sputums being converted after the ninth month. More than 90 per cent turn negative within the first six months of treatment. No definite relation was established between the side of the lesion and maximal conversion, although all left-sided cases yield a slightly higher percentage of conversion (10) within the first three months of treatment. When the duration of the illness prior to pneumothorax is six months or less, the chances of the sputum becoming negative within the first three months is good (80 per cent). A longer dura-

tion of illness before pneumothorax therapy shows no definite correlation with the interval of sputum conversion. Low intrapleural pressures are just as effective as high pressures in suppressing tubercle bacilli in the sputum. The anatomic extent of unilateral lesions appears to have little relation to the rate of sputum conversion after pneumothorax is instituted. The most direct relation was established between age and maximal conversion. Other things being equal, the younger the patient the sooner does his sputum become negative after pneumothorax therapy. More than 70 per cent of the sputums of patients from 16 to 25 years of age became converted within the first three months and almost all of them became negative within six months of treatment. A reverse ratio is observed in the older persons. These ratios can be used as a reliable index as to the time limit of effectiveness of pneumothorax when the advisability of other measures of collapse therapy is considered.

Tuberculosis in the Aged.—In his study of tuberculosis in the aged, Wiese states that of 100 men fifty-nine had positive sputums and of thirty-five women the sputums of eighteen were positive. These 135 patients 60 or more years of age were ill from three weeks to 366 months before admission, the average being 41.6 months. Of the seventy-seven positive patients, sixty-four were either married or widowed. It is impossible to estimate what damage they have done in the way of spreading tuberculosis among a generation younger than themselves. That, to the author, is the all important question to be considered. He hopes that the generally accepted opinion that all elderly persons must cough and that such coughing is without danger will soon be changed and that all elderly persons with a chronic cough, with or without sputum, will be subjected to as rigorous an examination as a younger person. Geriatrics is a rapidly developing branch of medicine; it is reasonable to assume that in the near future one of its major problems, at least from a prophylactic point of view, will be tuberculosis in the aged.

Archives of Surgery, Chicago

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Conservative Treatment of Occlusive Arterial Disease. I. Wright, New York.—p. 163.
Thrombo-Angiitis Obliterans: Treatment with Sodium Tetrathionate and Sodium Thiosulfate. F. V. Theis and M. R. Freeland, Chicago.—p. 190.
Therapy of Phlebothrombosis and Thrombophlebitis. A. Ochsner and M. DeBakey, New Orleans.—p. 208.
Lymphedema of Limbs. J. Homans, Boston.—p. 232.
Amputation for Peripheral Vascular Disease. G. de Takáts and J. T. Reynolds, Chicago.—p. 253.
Periarteritis Nodosa Simulating an Acute Abdominal Condition Requiring Operation. P. D. Allen, New York.—p. 271.
*Peripheral Vasospasm from Tobacco. C. A. Moyer and W. G. Maddock, Ann Arbor, Mich.—p. 277.
Surgical Intervention on Sympathetic Nervous System for Peripheral Vascular Disease. R. H. Smithwick, Boston.—p. 286.
Heparin in Surgical Treatment of Blood Vessels. G. Murray, Toronto.—p. 307.
Influence of Temperature on Development of Gangrene in Peripheral Vascular Disease. N. E. Freeman, Philadelphia.—p. 326.
*Effect of Estrogens on Vascular Spasm Due to Active Angiitis in Extremities. L. G. Herrmann and E. J. McGrath, Cincinnati.—p. 334.
Speed of Blood Flow in Arteries and in Veins of Man. W. F. Kvale, L. A. Smith and E. V. Allen, Rochester, Minn.—p. 344.
Diabetic Gangrene: Review of 972 Cases of Gangrene Associated with Diabetes Mellitus Treated at the New England Deaconess Hospital. L. S. McKittrick, Boston.—p. 352.
Recent Advances in Anesthesia—1939. R. C. Adams, Rochester, Minn.—p. 364.

Peripheral Vasospasm from Tobacco.—Moyer and Maddock declare that tobacco, regardless of its form or the manner in which it is used, produces peripheral vasospasm. It has been indicted as the inciting cause of thrombo-angiitis obliterans without actual proof. As to its effect on the course of the disease, it is general knowledge that continued smoking is associated with progressive circulatory deficiency in spite of the application of all known medical aids. Silbert has not seen a recurrence of the disease once it had been arrested by treatment unless the patient resumed smoking. The manner in which tobacco induces the pathologic process, if it actually is able to do so, is not known. No parallelism has been established between hypersensitiveness to tobacco extracts and the degree of vascular response to smoking. The question whether sensitization to tobacco is the prime factor in the causation of thrombo-angiitis obliterans is still open. The possibility that chronic vasospasm incident to the use of tobacco for long periods may in itself be highly important etiologically has likewise been neither proved nor disproved. However, drugs unallied in structure to nicotine are capable of producing peripheral gangrene; thus it is conceivable that nicotine may occasionally do likewise. It is also possible that chronic vasospasm may simply be a strong contributing factor to the pathologic process which is maintained by some to be due to specific endarteritis. This may well represent the actual role of tobacco in the causation of thrombo-angiitis obliterans. Whether or not an actual causal relation between tobacco and thrombo-angiitis obliterans can be established, it is absolutely essential to abstain from tobacco, as the primary aim in the treatment of any acute peripheral vascular deficiency is to maintain a sufficient blood flow to support metabolic processes in the diseased member. Any drug as active as nicotine in producing a decreased blood flow in the extremities must be assiduously avoided, or treatment is useless. One might well say "Your legs or your cigarets" and refuse to treat any patient with thrombo-angiitis obliterans who continues to smoke. Patented filters and denicotinized cigarets must likewise be prohibited, as proof exists that these processes are not adequate to prevent the vasospasm associated with smoking.

Effect of Estrogens on Vascular Spasm.—Herrmann and McGrath, in the treatment of sixteen patients with arterial insufficiency due to secondary vasomotor instability associated with active arteritis or phlebitis, used moderate quantities of estrogen parenterally (estrone, or theelin) at regular intervals for at least sixteen weeks. The final evaluation of the patient's condition was based on objective studies of the efficiency of the peripheral vascular system and on an analysis of the patient's account of the effects on the signs and symptoms of the disease of a variety of environmental conditions. Pain was pronounced in twelve of the patients and they were given moderately large amounts (50 mg. intravenously each day for five days) of thiamin chloride in addition to the estrogenic substances. Eleven of the sixteen patients have been so improved that they were able to return to their work. Either the vasomotor instability completely disappeared or the disease process remained so quiescent that it caused no great disability or concern. Pain in the digits showed equal improvement. Vascular studies of these patients showed a more nearly normal vascular response under natural environmental conditions and in a constant temperature room. Three patients had a recrudescence of the signs and symptoms after two years of relief, but the activity of the process again subsided, although less completely, after another course of treatment with estrogen. The symptoms of four of the remaining patients have remained unchanged after many months of observation and the symptoms of the last patient continued to grow worse in spite of all therapeutic effort.

California and Western Medicine, San Francisco

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Combined Nitrous Oxide-Oxygen Local Anesthesia. R. K. Gilman, San Francisco.—p. 56.
Recent Advances in Treatment of Hematemesis and Melena. G. H. Lanphere, Los Angeles.—p. 59.
Chronic Nonhealing Lesions of Nose. R. Fletcher, San Francisco.—p. 62.
Immunity: Clinical and Experimental Observations. H. E. Thelander, San Francisco.—p. 64.
*Idiopathic Ulcerative Colitis: Effectiveness of Liver Extract in Its Treatment. G. Cheney, San Francisco.—p. 66.
Epidermophytosis of Hands and Feet: Its Treatment. H. E. Alderson, San Francisco.—p. 68.
Hyperemesis Gravidarum. A. Bernstein, San Francisco.—p. 69.
Ruptured Membranes Prior to Onset of Labor. R. D. McBurney, Los Angeles.—p. 72.

Liver Extract for Idiopathic Ulcerative Colitis.—Cheney used liver extract parenterally in the treatment of twenty-five cases of idiopathic ulcerative colitis. From 10 to 20 U. S. P. units of the extract was injected three times a week for the first two weeks and then twice a week thereafter until a complete remission ensued. Maintenance therapy was essential to maintain good health. An injection of 20 U. S. P. units every one to three weeks was usually sufficient, but the necessary dose of liver extract varied with the individual patient. Signs of improvement, such as diminution of the diarrhea, formed stools, increase in appetite and gain in weight, were usually noticeable by the third week of treatment. There was

no correlation between the severity of the disease and the time of response. Besides the injection of liver extract a high calory, low residual diet, camphorated tincture of opium symptomatically and bed rest for the acutely ill patient was prescribed. Occasionally a vegetable muceloid or kaolin was given to solidify the stools during the early course of treatment. Rectal instillations were avoided. Patients who do not do well on liver extract therapy must be carefully scrutinized to detect any factors which are acting as a barrier to their recovery, as liver extract therapy alone may be ineffective. These factors are likely to be one or more of the following: The diagnosis may be incorrect. There may be contributory factors to the infection. Allergy and nervous system instability may be of such importance as to nullify any beneficial effect of the liver extract. The extent of the destructive process in the intestinal wall must be considered and the choice of liver extract may have an important bearing on the outcome of treatment. Until recently the author used a highly concentrated liver extract. Highly concentrated applies only to the antianemic substance, fraction G, and in liver extract so concentrated practically all of the vitamin B_1 and B_2 are eliminated. It is not only probable that any substance effective in the treatment of ulcerative colitis may also be lost in the concentration process, but the administration of an unconcentrated liver solution parenterally to four patients recently indicates that it may be more effective than the concentrate. It was given intramuscularly in a dose of 5 cc. two or three times a week, representing only 5 U. S. P. units (antianemic) per dose.

Endocrinology, Los Angeles

26: 189-368 (Feb.) 1940. Partial Index

Studies on Mechanism of Diabetic Disturbance Using "Nitrogen Minimum Excretion" as Measure of Glyconeogenesis. S. J. Thannhauser, Boston.—p. 189.

Oral Use of Pregneninonol in Functional Menometrorrhagia. E. C. Hamblen, N. B. Powell, W. K. Cuyler and C. J. Pattee, Durham, N. C.—p. 201.

Comparison of Different Preparations of Amorphous and Zinc Crystalline Insulin. F. M. Allen, New York.—p. 208.

*Masked Hypothyroidism Having Abdominal Symptoms: Three Cases. A. Bassler, New York.—p. 218.

Medical Treatment of Hyperthyroidism. W. Redisch, New York, and W. H. Perloff, Philadelphia.—p. 221.

Acromegaly Studied During Course of Disease and at Autopsy: Case. G. Flaum and Elaine P. Ralli, New York.—p. 229.

Inhibition of Lactation Post Partum with Testosterone Propionate. J. S. Beilly and S. Solomon, New York.—p. 236.

*Muscle Strength in Myotonia Atrophica (Dystrophia Myotonica) Improved by Testosterone Propionate. F. H. Hesser, O. R. Langworthy, Baltimore, and S. A. Vest, Charlottesville, Va.—p. 241.

Further Studies on Purification of Mare Gonadotropic Hormone. H. Goss and H. H. Cole, Davis, Calif.—p. 244.

Further Studies on Relation of Thyroid and Hypophysis to Ovarian Responses of Menopause Urine Extracts. S. L. Leonard and J. De Frates, New Brunswick, N. J.—p. 255.

Mode of Action of Testosterone Propionate on Female Genital Tract. J. W. Huffman and L. H. Bos, Chicago.—p. 259.

Androgenic Action of Desoxycorticosterone. C. W. Hooker and V. J. Collins, New Haven, Conn.—p. 269.

Masked Hypothyroidism with Abdominal Symptoms.—Bassler presents the cases of three women with hypothyroidism masked by gastrointestinal disturbances. The symptoms have no regularity. Modifications of the classic symptoms seen in distinct myxedema appear in most of the cases. They are not striking and often escape detection. The symptoms helpful in the diagnosis of masked hypothyroid states are pain in the abdomen, pallor and dry skin, blood pressure never above normal and usually below, a tendency to subnormal temperature, mental depressions and poor memory, sparseness or absence of pubic hair and retarded development of the genitalia, low basal metabolic rates and leukopenia with generally a high relative lymphocyte count. The author's patients were dramatically and rapidly benefited by thyroid therapy. Why there was abdominal pain and tenderness is not understood. It may have been neurogenic in origin; it certainly was not due to colonic stasis or constipation.

Muscle Strength in Atrophic Myotonia Improved by Testosterone Propionate.—Two men with atrophic myotonia and testicular atrophy were treated by Hesser and his associates with 25 mg. of testosterone propionate intramuscularly every other day for more than two months. Quinine was taken daily. The dynamometric response of the finger flexors was recorded graphically to note strength (single maximal contraction), total work and maximal flexion rate before and during treatment. Other subjective and objective changes accompanying treatment were carefully observed. Within the week of the first injection the grip became stronger rapidly, reached a peak within the next two weeks and leveled subsequently at the higher base line. Temporary withdrawal of the drug from one patient resulted in decreased dynamometric values four days after the last injection. Both patients were gratified with the outcome of treatment, especially the sense of greatly increased strength and the general constitutional improvement. Buoyancy of spirit, feeling of well being and lessened fatigability were observed. Posture and gait improved noticeably. A weight gain of some 15 pounds (6.8 Kg.) occurred; this might have been due to hydration or actual muscle dimension changes (hypertrophy). Frequency of micturition correlated with previous observations on bladder musculature. Recurrent priapism with increased sex urge became evident. A third male patient given androgen without quinine showed no change in myotonia. Another man with moderately advanced progressive muscular dystrophy but no gonadal changes was treated with testosterone propionate without demonstrable dynamometric response. How androgenic hormone influences muscle activity is unexplained. It is responsible for the greater muscular development and capacity of the adult male and certainly its inadequacy accounts for the well known muscle alterations in male castrates. The effect seems a predominantly mechanical one. Its ability to cause electrolyte, nitrogen and water retention in these individuals indicates that testosterone undoubtedly acts as a metabolic synergist in much the same manner as adrenal cortical substance. When the two patients were deprived of treatment the condition reverted, in a month, to its original status. The authors state that the effect of androgen probably is a nonspecific one and one that would occur in any castrate. However, to be more certain of the specificity and mode of action of testosterone propionate in atrophic myotonia they are continuing the treatment of these and other patients.

Journal of Experimental Medicine, New York

71: 129-282 (Feb.) 1940. Partial Index

Significance of Synovial Villus and Ciliary Process as Factors in Localization of Bacteria in Joints and Eyes of Rabbits. D. M. Angevine and S. Rothbard, New York.—p. 129.

Characteristics of a Strain of Lymphocytic Choriomeningitis Virus Encountered as Contaminant in Tissue Cultures of Rabies Virus. J. Casals-Ariet and L. T. Webster, New York.—p. 147.

*Symptomatic Herpes, Sequela of Artificially Induced Fever: Incidence and Clinical Aspects, Recovery of Virus from Herpetic Vesicles and Comparison with Known Strain of Herpes Virus. S. L. Warren, C. M. Carpenter and Ruth A. Boak, Rochester, N. Y.—p. 155.

Thermal Inactivation Time at 41.5 C. of Three Strains of Herpes Simplex Virus. Ruth A. Boak, C. M. Carpenter and S. L. Warren, Rochester, N. Y.—p. 169.

Studies on Experimental Hypertension: XI. Effect of Excision of Carotid Sinuses on Experimental Hypertension Produced by Renal Ischemia. H. Goldblatt, J. R. Kahn, F. Bayless and M. A. Simon, Cleveland.—p. 175.

*Toxoplasmic Encephalomyelitis: IV. Experimental Transmission of Infection to Animals from a Human Infant. A. Wolf, D. Cowen and Beryl H. Paige, New York.—p. 187.

Presence in Syphilitic Serum of Antibodies to Spirochetes, Their Relation to So-Called Wassermann Reagin and Their Significance for Serodiagnosis of Syphilis. H. Eagle and R. B. Hogan, Washington, D. C.—p. 215.

Herpes After Artificially Induced Fever.—Warren and his colleagues observed herpes in 190 of the 411 patients subjected to artificial hyperpyrexia for the treatment of acute or chronic gonococcic infection, chronic infectious arthritis, advanced syphilis of the central nervous system, multiple sclerosis, asthma and malignant tumors. Only seven of 131 had a second, but less severe, attack with a subsequent treatment; therefore 183 of the patients acquired some immunity to the disease. No correlation could be found between the occurrence of the herpes and the hyperpyrexia method, duration or height of the fever, suggesting that the elevation of temperature rather than the disease provides the stimulus for the development of herpes. The cases of herpes usually appeared in series. At times there were no cases for from ten to thirty days; at other times, for a week or longer, herpes developed in almost every patient subjected to the therapy. The simultaneous appearance of encephalitis-like symptoms with extensive herpetic facial lesions after induced fever suggests that the herpes and the "encephalitis" were due to the same causative agent. The course and type of the disease was similar in almost every instance. Because of this the lesions from eight patients were examined for the presence of a filter-

passing virus. Four of the six strains of virus recovered from these herpetic lesions were identified further by investigating their immunologic relationship to a known strain of herpes virus (Frank strain) by means of cross immunization of rabbits. The plan was to immunize the rabbits to each of the unknown strains and test them for immunity to the Frank strain and likewise to immunize animals to the Frank strain and test their immunity to each of the recently recovered strains. Three rabbits immunized to the strains of herpes virus, Mu, St and Ra respectively, showed no signs or symptoms of encephalitis after intracerebral injection of 0.1 cc. of a 10 per cent brain suspension of the Frank strain. Two of them, under observation for six months, at no time showed any evidence of the disease. The third died after twenty-one days from trauma incurred while the rectal temperature was being taken. No evidence of herpes was revealed at necropsy. One rabbit injected with the Bo strain of herpes virus died of typical encephalitis ten days after the Frank strain was administered. The two animals which had recovered from encephalitis during the course of animal passage of strain St and Bo survived inoculation of the Frank strain. The two control rabbits injected only with the Frank strain of herpes virus died in three and five days, respectively, with characteristic symptoms of herpes encephalitis. Of the five rabbits in which attempts were made to induce immunity to the Frank strain, only one survived the entire course of inoculation. This animal when injected with strain Bo intracerebrally died within four days. In two other animals encephalitis developed during the course of immunization, which terminated in death. The recovery from herpetic vesicles from fever-treated patients of a filter-passing virus similar to known strains of herpes virus indicates that the disease accompanying artificially induced fever is similar to herpes simplex resulting from acute infectious diseases.

Experimental Transmission of Toxoplasmic Encephalomyelitis.—Wolf and his co-workers encountered a case of granulomatous encephalomyelitis due to a protozoon. They transmitted the infection to three rabbits and six infant mice and identified the causative micro-organism as a Toxoplasma. The authors state that a parasite identical with that in the lesions of the human case was found in the lesions of the experimental animals. The morphology of this micro-organism, the course of the disease and the lesions produced in the animals inoculated with it, the wide host range of this parasite and the results of cross-immunity experiments establish its identity as a Toxoplasma. It is suggested that the micro-organism be designated Toxoplasma hominis. The infection in the infant is the first proved instance of human toxoplasmosis. Since the lesions were confined to the central nervous system the disease is termed toxoplasmic encephalomyelitis. This records the first experimental transmission of human toxoplasmosis to animals.

Journal Industrial Hygiene & Toxicology, Baltimore

22: 53-88 (Feb.) 1940

*Comparative Physiologic Effects of Pure, Commercial and Crude Benzenes. H. H. Schrenk, W. P. Yant, S. J. Pearce, Pittsburgh, and R. R. Sayers, Washington, D. C.—p. 53.

*Silicosis and Type III Pneumococcus Pneumonia: Experimental Study. A. J. Vorwald, A. B. Delahant and M. Dworski, Saranac Lake, N. Y. —p. 64.

Acute Vapor Toxicity of Allyl Chloride. E. M. Adams, H. C. Spencer and D. D. Irish, Midland, Mich.—p. 79.

Effects of Pure, Commercial and Crude Benzenes.—From experimental tests to determine the comparative physiologic effects of pure, commercial and crude benzenes, Schrenk and his associates find that crude benzene produced the least physiologic action. Pure and commercial benzenes had about the same physiologic effect, the latter producing a slightly greater effect on dogs and the former a somewhat greater effect on guinea pigs. The physiologic response to pure and crude benzenes was much the same. The response of the animals was characteristic of benzene poisoning, and the physiologic effect apparently was due primarily to the benzene content of the benzenes and not to impurities.

Silicosis and Type III Pneumococcus Pneumonia.—The unusual susceptibility of the silicotic lung to tuberculosis has led to the inference that such lungs may also be more vulnerable to pneumonia. To check the validity of this supposition, Vorwald and his colleagues carried out certain studies with the following results: 1. The addition of silica, either in particulate or in dispersed colloidal form, to a blood-broth culture medium had no influence on the growth or the morphology of type III pneumococci. 2. Silicotic rabbits showed no unusual susceptibility to type III pneumococcus infections produced by intracutaneous injection, by inhalation or by intrabronchial insufflation. 3. Type III pneumococcus pneumonia, produced experimentally in rabbits with advanced silicosis, ran a normal course, showed no tendency to organize and resolved as completely as in normal control rabbits. 4. Silicotic nodules were remarkably resistant to the action of pneumococci and retained without modification the distinctive characteristics of such lesions in rabbits. 5. The presence of silicosis had no influence on the well defined immune reactions to type III pneumococci that can be elicited in normal rabbits. Their natural resistance to avirulent and virulent strains was maintained and acquired resistance, conferred by previous infection, was apparently as well developed as in nonsilicotic control animals. 6. If the length of life is taken as an index of resistance, the observations suggested that if anything the presence of silicosis might actually enhance the resistance of the rabbit to type III pneumococcus infection.

Missouri State Medical Assn. Journal, St. Louis

37: 41-92 (Feb.) 1940

Present Status of Therapy with Sulfanilamide and Sulfapyridine. A. F. Hartmann, H. L. Barnett, Anne M. Perley and Mary B. Ruhoff, St. Louis.—p. 41.

Pneumonia in Childhood. W. M. Whitaker, Quincy, Ill.—p. 54.

Treatment of Depression and Melancholia. G. W. Robinson Jr., Kansas City.—p. 65.

New England Journal of Medicine, Boston

222: 167-204 (Feb. 1) 1940

Bone Lesions Accompanying Cervical Spinal Cord Injuries: End Result Study of Seventy-Six Cases. D. Munro and W. Wegner, Boston.—p. 167.

*Acute Abdominal Conditions Following Ovulation and Its Sequelae. D. J. McSweeney and F. O. Wood, Boston.—p. 174.

Estimation of Nutritional State in Children. M. M. Glazier, Boston.—p. 180.

"Common Colds." N. C. Turner, Arlington, Mass.—p. 184.

Gynecology: Pelvic Pain and Its Relief. J. V. Meigs, Boston.—p. 187.

Acute Abdominal Conditions Following Ovulation.—McSweeney and Wood direct attention to the fact that a ruptured graafian follicle, a bleeding corpus luteum, a ruptured corpus haemorrhagicum and a corpus haemorrhagicum cyst with or without rupture are conditions frequently overlooked in the differential diagnosis of acute lower abdominal pain in women. Ovulation may cause pain in several ways: by rupture of the graafian follicle when the ovum is being extruded—the so-called "mittelschmerz" (midperiod pain), after the ovum has been expelled and the blood escapes through failure of the stigma to become sealed off. Later in the cycle there may be pain due to rupture of the corpus haemorrhagicum or to the formation of a corpus haemorrhagicum cyst, which may cause pain of itself or by its rupture. A study of the records at the Boston City Hospital showed that, from 1926 through 1938, 257 patients were admitted with a chief complaint of abdominal pain due to ovulation or its sequels. Of these, 216 were operated on. Three types of cases were differentiated. There were seventy-four cases, including fifteen which were discharged without operation, which could be considered as cases of ruptured graafian follicle. The fifty-nine cases in which operation was performed were characterized by absence of free blood in the peritoneal cavity and by evidence of recent ovulation. In this group nothing was done surgically to the ovaries. There were 165 cases of ruptured corpus haemorrhagicum, in 139 of which operation was performed. The latter showed evidence of free blood in the pelvis. The cases were treated by a mattress suture. In the third category there were eighteen cases of corpus haemorrhagicum cyst, of which thirteen had ruptured. Resection was done in all the cases of this group. The authors studied the relative incidence of acute appendicitis and pain due to ovulation during two typical years and found that there was one case with pain from ovulation to every thirteen of appendicitis. In order to determine how frequently ovulation may cause abdominal discomfort not sufficiently severe to demand medical aid, the authors questioned for a month all

gynecologic patients who had normal menstrual regularity and found that twenty-one of 134 patients, or about one in six, frequently had abdominal pain of a minor degree midway between periods and that fifty-three of 134 patients (40 per cent) had some symptoms suggesting ovulation. Appendicitis and pain consequent to ovulatory phenomena may exist simultaneously. In cases in which the differentiation is not positive, a midline incision instead of a right rectus or McBurney's is suggested in order to simplify the exploration of the pelvis.

New York State Journal of Medicine, New York

40: 153-234 (Feb. 1) 1940

Primary Ileocecal Tuberculosis. B. B. Crohn and H. Yarnis, New York.—p. 158.
Treatment of Operable Rectal Cancer. G. E. Binkley, New York.—p. 167.
Acute Abdominal Conditions. R. F. Barber, Brooklyn.—p. 173.
Serologic Tests as Aids in Diagnosis and Prognosis of Syphilis. A. B. Wadsworth, Albany.—p. 177.
Role of Endocrines in Dermatology. J. J. Eller and L. H. Kest, New York.—p. 182.
Sparing Effect in Poliomyelitis. G. Dalldorf, Valhalla.—p. 187.
Immobilization of Chest in Pleurisy and Rib Fracture. H. J. Christensen, Poughkeepsie.—p. 191.
Obstetrics in a General Hospital: Ten Thousand Cases at the Bronx Hospital. J. I. Kushner, New York.—p. 194.
Late Irradiation Reaction in Bladder Wall Following Use of Radium in Uterine Disease. C. C. Herger and A. A. Thibaudeau, Buffalo.—p. 199.
Effect and Toxic Effect of Sulfapyridine in Old Age Pneumonia. P. Kaufman, New York.—p. 204.
Management of Complications Arising During Cyclopropane Anesthesia. H. R. Griffith, Montreal.—p. 209.

Rocky Mountain Medical Journal, Denver

37: 73-160 (Feb.) 1940

*Early Diagnosis and Treatment of Cervical Cancer. H. E. Schmitz, Chicago.—p. 90.
Should Quiescent Adenomatous Goiters Be Removed? N. F. Hicken, Salt Lake City.—p. 94.
Trimalleolar Fracture of Ankle with Backward Displacement of Foot. R. G. Packard, Denver.—p. 100.
Obstetric and Gynecologic Complications Caused by Anterior Lip of Cervix. J. W. Sugden, Salt Lake City.—p. 103.
The Doctor and the Nurse at Work. J. Erwin, Denver.—p. 106.
Method for Quantitative Estimation of Sulfanilamide and Sulfapyridine in Blood and Urine. W. W. Williams, Denver.—p. 110.
Relation of Capillary and Corneal Osmosis to Glaucoma Therapy. W. H. Luedde, St. Louis.—p. 112.
Medical Photographic Technic. D. D. Long, Denver.—p. 113.
Treatment of Arthritis: Physiologic Approach. R. W. Kullberg and L. M. Lowell, Astoria, Ore.—p. 114.

Early Diagnosis and Treatment of Cervical Cancer.—Schmitz states that, since 1932, 1,104 cases of carcinoma have been admitted to the gynecologic tumor clinic of the Cook County Hospital. The diagnosis in each instance has been made or confirmed by biopsy. In a previous series of cases genital carcinoma was found to comprise 27 per cent of cancer in the female subject, and 79.61 per cent of the genital group occurred in the cervix. As 75 per cent of the present series were far advanced when first seen, it can be readily appreciated how markedly the end results could be improved were the cases diagnosed while in the early stage, which has a curability of from 80 to 100 per cent. Magnification of lesions by means of the colposcope is of definite value in bringing about more careful study of the cervix. He describes the Schiller iodine test and advocates it as an aid in picking the site for biopsy. Biopsy is the most valuable aid in diagnosing early cancer. There is no proof that the procedure is injurious. Whether alteration in cellular morphology is sufficient to diagnose cancer is questionable. Invasion plus atypia is definitely so. The author considers irradiation as the method of choice in the treatment of cervical cancer, surgery having a slightly inferior salvage rate and a much higher mortality rate. Moreover, about 12 per cent of inoperable cases are amenable to radiation therapy. General emaciation and cachexia, and anemia as well as impaired nitrogen metabolism, are contraindications to radiation.

South Carolina Medical Assn. Journal, Greenville

36: 1-32 (Jan.) 1940

Shall We Be Leading Pioneers or Driven Slaves? C. B. Epps, Sumter.—p. 1.
State Medicine, Affirmative (Advantages). W. G. Bishop, Greenwood.—p. 6.
Birth Registration in South Carolina. H. L. Dunn, Washington, D. C.—p. 14.

Southern Medical Journal, Birmingham, Ala.

33: 123-228 (Feb.) 1940. Partial Index

Parathyroid Osteosis: Report of Severe Case with Successful Removal of Large Parathyroid Tumor. J. Vance, J. Rogde and L. W. Breck, El Paso, Texas.—p. 128.
Radiation Therapy in Carcinoma of Fundus of Uterus. C. L. Martin, Dallas, Texas.—p. 135.
Analysis of Intracutaneous Tests on 309 Patients for Lymphogranuloma Venereum and Chancroid. H. M. Robinson, Baltimore.—p. 144.
*Effect of Pregnant Mare's Serum Hormone on the Abnormal Ovary. L. A. Gray, Louisville, Ky.—p. 160.
Status of Retrobulbar Neuritis in Paranasal Sinus Disease. J. B. Costen, St. Louis.—p. 170.
Surgery of Biliary Tract. A. S. Jackson, Madison, Wis.—p. 177.
Considerations in Evaluating the Therapy of Hay Fever. C. H. Eyermann, St. Louis.—p. 190.
*Routine Tuberculin Patch Testing in Infancy. L. Bivings, Atlanta, Ga.—p. 194.
Recent Studies of Epidemic Diarrhea and Dysentery. E. L. Stebbins, Albany, N. Y.—p. 197.
Maintenance of Health Among Railway Employees. J. W. Davis, Statesville, N. C.—p. 203.
Sulfapyridine in Pneumonia. V. E. Schulze, San Angelo, Texas.—p. 209.
Toxic Effects of Sulfanilamide. G. J. Levy, Memphis, Tenn.—p. 212.
Common Errors in Diagnosis and Treatment of Anemias. P. A. Tuckwiller, Charleston, W. Va.—p. 216.

Pregnant Mare's Serum Hormone and Abnormal Ovaries.—Gray studied the effect of pregnant mare's serum hormone in the form of "gonadogen" on the endometrium of thirty-three women with abnormal ovarian secretion. Of eleven women complaining of amenorrhea, treated from one to sixteen months, eight menstruated, seven regularly or fairly so. A gradually developing premenstrual secretory endometrium was observed in at least four, two were apparently refractory and two women were insufficiently treated. Of seven women with endometrial hyperplasia associated with metrorrhagia, a secretory endometrium was obtained by one middle aged woman. Only one of the six younger patients was clinically regulated. Of seven women having interval nonsecretory endometriums and metrorrhagia, slight secretion developed in three and a normal premenstrual endometrium in one. Only two were clinically cured. Two patients with secretory endometrium and metrorrhagia were not improved. Six women, all with minor metrorrhagia but one in which no biopsies were taken, were improved or cured. The pregnant mare's serum hormone will apparently often stimulate the abnormal ovary when there is subnormal stimulation, as in amenorrhea and oligomenorrhea. It is possibly of value in metrorrhagia when the uterus is small.

Routine Tuberculin Patch Testing in Infancy.—Bivings believes that tuberculin patch testing of all infants reaching 1 year of age would uncover many heretofore unsuspected sources of tuberculous infection, such as in nurses, especially Negro. It should not be regarded as final evidence when negative but should be followed by 0.1 mg. of old tuberculin intracutaneously in suspected cases. Because of its simplicity and safety and lack of pain it would make an excellent substitute for the primary test in all cases.

Western J. Surg., Obst. & Gynecology, Portland, Ore.

48: 63-128 (Feb.) 1940

Biologic Characteristics of Equine Gonadotropic Hormone. C. F. Fluhmann, San Francisco.—p. 63.
The Gynecologist and the Law. C. W. Page, Berkeley, Calif.—p. 75.
Some Legal Aspects of Obstetrics. H. C. Alward, Los Angeles.—p. 84.
Artificial Cross Insemination. G. S. Beardsley, Eugene, Ore.—p. 94.
Hip Arthroplasty, with Vitallium Cap. K. Speed, Chicago.—p. 101.
Nose Defects, Partial: New Modification of the "French" Method of Restoration with Sliding Flaps of Adjoining Tissue. E. D. Twyman, Kansas City, Mo.—p. 106.
Sulfodioctylsuccinate and Maleic Acid Mixture in Clinical Contraception. H. C. Mack and R. S. Siddall, Detroit.—p. 110.
Surgical Approach to Hypertension: Division XI. F. M. Findlay, San Diego, Calif.—p. 118.

West Virginia Medical Journal, Charleston

36: 49-96 (Feb.) 1940

Occlusive Peripheral Vascular Emergencies. E. J. C. Hildenbrand, Washington, D. C.—p. 49.
Significance of Oxygen to Surgical Patient. D. E. Brace, New York.—p. 57.
Cardiac Aneurysm. G. S. Hartley, Clifton Forge, Va.—p. 64.
Advanced Pneumoconiosis with Pulmonary Artery Thrombosis. J. L. Wade, Parkersburg.—p. 69.
Edgar Allan Poe (Psychiatric Case Study). E. F. Reaser, Huntington.—p. 73.
Glaucoma. T. W. Moore, Huntington.—p. 80.
Problems Relating to Indigent and Low Income Medical Cases in West Virginia. D. A. MacGregor, Wheeling.—p. 84.

FOREIGN

An asterisk (*) before a title indicates that the article is abstracted below. Single case reports and trials of new drugs are usually omitted.

British Medical Journal, London

1: 79-116 (Jan. 20) 1940

Investigations and Observations on Inoculation Technic. J. W. Bigger, J. W. S. Blacklock and H. J. Parish.—p. 79.
Nasal Sinusitis in Children. D. Guthrie.—p. 84.
Childbirth After Presacral Neurectomy. T. V. Pearce.—p. 87.
Sulfapyridine in Treatment of Acute Urethritis. N. S. Taylor.—p. 88.
Results of Treatment of Gonorrhea with Sulfapyridine: Further Observations. E. E. Prebble.—p. 89.

1: 117-158 (Jan. 27) 1940

*Gonorrheal Myocarditis. O. Bang.—p. 117.
Prevention of Anxiety. R. G. Gordon.—p. 120.
Management of Respiratory Depression During Anesthesia. F. B. Mallinson.—p. 123.
Value of Inbred Mice in Relation to General Study of Mammary Cancer. Georgiana M. Bonser.—p. 125.
Quintuplets: Record of Premature Delivery. R. K. Rau, A. A. Aiyar and T. V. Mathew.—p. 127.

Gonorrheal Myocarditis.—According to Bang, apart from the myocardial involvement in septic endocarditis, myocarditis is seldom established as a complication of gonococcic infection. Gonococcic infection is never mentioned in the current textbooks on heart diseases as a possible cause of myocarditis, though almost every other common infectious disease is recognized as such. Six cases of gonorrheal myocarditis were encountered within one year in an ordinary medical ward. This, the author believes, may mean that the condition, escaping detection since it is not searched for, is more common than ordinarily believed. The diagnosis in the six cases was made on the ground that all of them had changes in the electrocardiogram occurring in the course of acute or chronic complicated gonococcic infection. In some instances the myocarditis was slight and transitory. In two cases incomplete bundle branch block developed and persisted, and in a third case the anginal pain still troubled the patient considerably when he was reexamined a year later. Such a course suggests the possibility that some of these patients will return to the hospital sooner or later with chronic heart disease. It is possible also that some of the chronic "degenerative" heart diseases seen today may arise from a gonococcic infection. The gonococcus complement fixation reaction has been instrumental in pointing out how many so-called rheumatic arthritis cases were really gonorrheal. It may be worth while to search the anamnesis of heart patients for gonorrhea, as the complement fixation reaction may reveal that some instances of cardiac lesions attributed to rheumatic infection ought to be regarded as following persistent gonococcic infection.

Journal of Laryngology and Otology, London

55: 1-74 (Jan.) 1940

Anatomy of Salpingopharyngeus Muscle. J. K. McMyn.—p. 1.

Journal of Pathology and Bacteriology, Edinburgh

50: 1-200 (Jan.) 1940. Partial Index

*Carbohydrate Metabolism and Staphylococcic Infection in Rabbits. S. H. Jackson, T. F. Nicholson and W. L. Holman.—p. 1.
Effects Produced by Toxic and Nontoxic Extracts of Haemophilus Pertussis and Brucella Bronchiseptica on Blood Sugar of Rabbits. J. G. Oddy and D. G. Evans.—p. 11.
Histology of Catarrhal Influenzal Bronchitis and Collapse of Lung in Mice Infected with Influenza Virus. M. Straub.—p. 31.
Immunity and Antibody to Influenza in Mice. C. L. Oakley and G. Harriet Warrack.—p. 37.
Occurrence of Intranuclear Inclusions in Cultures of Fetal Leptomeninges. Catherine F. Fischmann and Dorothy S. Russell.—p. 53.
Congenital Diverticulum of Left Ventricle of Heart in Case of Epiloia. R. M. Norman and A. L. Taylor.—p. 61.
Observations on Bacteriostatic Action of Sulfanilamide and Sulfapyridine and on Influence Thereon of Bacteria and Peptone. A. Fleming.—p. 69.
Effect of Desensitization of Tuberculous Guinea Pigs. G. S. Wilson, Herta Schwabacher and Irene Maier.—p. 89.
Adaptation in Veins to Increased Intravenous Pressure, with Special Reference to Portal System and Inferior Vena Cava. P. L. Li.—p. 121.

Carbohydrate Metabolism and Staphylococcic Infection.—Jackson and his associates observed the effect of experimental staphylococcic infections on carbohydrate metabolism in normal rabbits and in rabbits in which a certain degree of intolerance for dextrose had been produced. The results indicate that the effect of a staphylococcic lesion in rabbits on their carbohydrate metabolism bears a direct relation to the degree to which the lesion is localized. When the lesion is poorly localized so that a spreading necrotic area results, the infection lowers the ability of the organism to metabolize dextrose, in both types of rabbits. However, if the lesion is well localized, with a small area of necrosis and a local accumulation of free pus, the effect of the infection is, if anything, the reverse. It seems possible from clinical reports that these observations on rabbits may be extended to man in a general way. Consistent disturbances in carbohydrate metabolism in cases of large, inflamed, pustular areas of infection and in indurated acne have been reported. The lack of consistency in reported clinical observations can be explained in part by the divergent effects of these two general types of staphylococcic lesions. The observation that a high carbohydrate diet will tend to localize better the infection agrees with the results of Tauber, who gave dextrose intravenously to a number of patients with furunculosis and obtained remarkably good results. These effects on carbohydrate metabolism appear to be related to the elaboration and absorption of toxin or other bacterial products from the infected areas. Toxin injections in both normal and high carbohydrate-dieted animals result in a necrotic area and a decrease in the tolerance for dextrose. This is not alone an effect of the necrosis, as a similar necrosis induced by burns or turpentine was without effect. The only difference between the staphylococcic lesion in normal rabbits and the turpentine lesion was the absence from the latter of bacteria and hence of bacterial products. Yet the former lesion produced a decreased dextrose tolerance while the latter had no effect.

Journal of Physiology, Cambridge

97: 273-432 (Jan.) 1940. Partial Index

Vascular Reactions of Cat After Total Sympathectomy. G. L. Brown and W. d'A. Maycock.—p. 273.
Sympathomimetic Action of Local Anesthetics. J. Tripod.—p. 289.
Primary Acidity of Gastric Juice. T. Teorell.—p. 308.
Production of Exophthalmos in Dog by Acetylcholine. C. E. Brunton.—p. 383.
Effects of Increased Metabolism on Ketosis of Depancreatized Dogs. S. B. Barker.—p. 394.
Disappearance from Blood of Intravenously Injected Insulin. H. K. Goadby and J. S. Richardson.—p. 417.

Lancet, London

1: 157-204 (Jan. 27) 1940

Future of Clinical Teaching. J. A. Ryle.—p. 157.
*Testosterone Propionate and Vasomotor Phenomena of Gonadal Deficiency. E. P. Sharpey-Schafer.—p. 161.
*Prognosis of Tetanus. L. Cole.—p. 164.
Congenital Cysts of Parotid Gland. T. Moore.—p. 168.
*Treatment of Eczema with Vitamin B Complex. K. P. Kristensen and S. N. Vendel.—p. 170.
Cerebrospinal Fluid in Alkalosis. H. Agar and I. Macpherson.—p. 171.
Basal Metabolism in Gastrointestinal Bleeding. D. A. K. Black.—p. 173.
Intestinal Ulceration in Myelogenous Leukemia. E. I. Jones.—p. 174.

Testosterone Propionate and Vasomotor Phenomena.—According to Sharpey-Schafer, it has long been recognized that disturbances of the vasomotor system may follow diminished activity or removal of the gonads in man. The menopause is usually associated with certain symptoms, of which the hot flush is the most characteristic, and the same symptoms develop at an earlier age after surgical removal of the ovaries. These vasomotor phenomena in women can be abolished by treatment with the estrogens. In the male, flushes may follow removal of the testes and can be abolished in a similar manner by treatment with the androgens. Although these facts are clear, the mechanism by which vasomotor phenomena are produced is still obscure. Work on the causation of flushes due to sex gland deficiency has been handicapped by the failure to observe similar symptoms in the experimental animal. The author describes observations in a number of cases which reveal that the administration of large doses of an androgenic substance causes flushes in both men and women with functioning gonads, and the flushes so produced may be stopped by the simultaneous administration of the estrogens in the same manner as spontaneous flushes in women are stopped by the estrogens. Yet, when the flushes are spontaneous, as in castrated women or men, testosterone propionate does not make the flushes more numerous but stops them, even when massive doses are used. These results appear contradictory, but from lack of other evidence the relationship

of the androgens to the flush phenomenon appears to be as follows: In castrates of both sexes administration of androgens appears to inhibit the action of some substances connected with the anterior pituitary. In normal subjects, on the other hand, large doses cause a grave disorganization of the endocrine system, probably consisting of a depression of the gonads and stimulation of the anterior pituitary. The author thinks that this experimental production of flushes by testosterone propionate may help to solve the problem of the causation of the vasomotor phenomena of gonadal deficiency.

Prognosis of Tetanus.—The observations by Cole are based on forty-three consecutive cases of tetanus treated by approximately the same method and closely observed throughout the illness. As soon as the diagnosis has been made, a large dose of antitoxin is given. The wound is not touched for at least an hour and surgical treatment is then limited to the minimum necessary to secure free drainage and irrigation with hydrogen peroxide. Control of reflex spasms is maintained with large doses of bromide in mild cases, and with paraldehyde, or more commonly avertin with amylene hydrate, in basal anesthetic doses by the rectum in severe cases. When either paraldehyde or avertin with amylene hydrate is used, cyanosis is controlled with warm nasal oxygen and atropine. All therapeutic and nursing activities likely to induce reflex spasms are reduced to a minimum. Care is taken that sufficient nourishment in fluid form is given throughout the illness. Antitoxin has in most cases been limited to a single intravenous dose of 200,000 international units, which has not been repeated. Latterly this dose has been reduced to 100,000 international units in a few mild cases, because it became clear that the larger dose was unnecessary. In five of the early cases it was given by the intrathecal and intramuscular routes as well as by the intravenous, and in these cases the injections were repeated during the early days of the illness. From subsequent experience it became clear that this variation in the method of giving antitoxin can have had no effect on the results and the use of the intrathecal method has been abandoned. The prognosis depends on the age and general physique, sex, type, severity and site of the wound, incubation period, rate of onset of symptoms, time at which antitoxin is given, and whether prophylactic antitoxin had been given. Patients over 60 have a small chance of recovery unless the disease is very mild. Cardiovascular degeneration, chronic bronchitis and emphysema, when combined with tonic rigidity of the chest, predispose to pneumonia, which is usually fatal. The prognosis is better in women. There is a direct relationship between the severity of the wound and the severity of the disease. Wounds of the upper limb show a higher case mortality than those of the lower. The incubation period is only a rough guide to prognosis, because it cannot be measured accurately. If it is less than seven days, the prognosis is usually bad; if it is more than fourteen, the prognosis is usually good. The period of onset of reflex spasms is the most useful guide. If these come on within forty-eight hours after the first symptoms of the disease appear, the prognosis is bad; if later, the prognosis is good. There is usually unnecessary delay in making the diagnosis and therefore in giving antitoxin. The administration of antitoxin at the earliest possible moment is as important in tetanus as it is in diphtheria. Prophylactic antitoxin should be repeated in all cases of suspicious wounds. All soldiers before going on active service should be actively immunized against tetanus. It is unnecessary to continue to give antitoxin when reflex convulsions have ceased and only tonic rigidity remains. An exception to this rule is when there is a septic wound which cannot be drained.

Medical Journal of Australia, Sydney

1: 71-106 (Jan. 20) 1940

Management of Acute Appendicitis. K. W. Starr.—p. 71.
Chemotherapy in Treatment of Gonorrhea in Males. V. N. B. Willis.—p. 82.
X-Rays in Treatment of Gas Gangrene. W. H. Godby.—p. 85.

South African Medical Journal, Cape Town

14: 1-24 (Jan. 13) 1940

Truants of Medicine in South Africa. W. L. Gordon.—p. 3.
Social Welfare as a Public Problem from the Housing and Nutrition Aspect. M. Maister.—p. 7.
Some Recent Advances in Urology. S. McMahon.—p. 12.

Presse Médicale, Paris

48: 81-96 (Jan. 24-27) 1940

Subdeltoid Bursitis. A. Basset and J. Meyer.—p. 81.
Realization of "Antigas" Filtrating Boxes of High Neutralizing Capacity and Corresponding to Needs of Respiratory Physiology. L. Dautrebande.—p. 83.
Wounds of Larynx and Their Immediate Treatment. J. Despons.—p. 85.
*Pyloric Stenosis and Pseudostenosis in Nurslings. E. Terrien.—p. 86.

Pyloric Stenosis and Pseudostenosis in Nurslings.—According to Terrien, symptoms of pyloric stenosis can exist in the absence of true organic stenosis of the pylorus. Such cases have been designated as pseudostenosis. The author discusses the signs and symptoms of the pyloric-syndrome and the differential diagnosis of pyloric stenosis and pseudostenosis. The syndrome, in his opinion, does not invariably imply the existence of a true stenosis. As long as doubt exists and the general condition remains satisfactory and the weight is maintained, it is advisable to be conservative and to restrict the treatment to medical measures. An attempt should be made to keep the infant in the ventral position. A change of the diet alone may be effective in preventing the formation of an undigested residue, gastric hypersecretion and spasm. The author stresses especially the advantages of small thick meals capable of allaying vomiting by a mechanism the explanation of which has recently been given by Marcel Lelong, namely, that with liquids the infant swallows large quantities of air, whereas with thick food this does not take place. At times it may be sufficient to replace the milk by buttermilk or even by a diet without milk. Gastric lavage should be performed four hours after the meal. It is particularly indicated in the cases in which large amounts of viscous contents are vomited. These may be the cause of the gastrospasm and the pylorospasm. Their removal may be followed by normal gastric function. If the gastric intolerance becomes more pronounced and is characterized by late vomiting and if the weight decreases rapidly, the surgical operation should not be postponed, for the success of the operation depends on an early intervention. With regard to the late vomiting the author states that in true stenosis this symptom does not begin with birth. On the contrary, the attacks of vomiting appear suddenly after two, three or four weeks of normal development. The author stresses that this lapse of time between birth and the appearance of the symptoms, the so-called free interval, is never missing in stenosis. Even if the intervention does not reveal a stenosis, the surgeon need not reproach himself, because postponing the operation too long involves a greater risk for the child than does the operation.

Gazetta degli Ospedali e delle Cliniche, Milan

61: 73-96 (Jan. 28) 1940. Partial Index

*Treatment of Exteriorized Parapneumothoracic Empyema. G. M. Rossi.—p. 75.
Pneumoconiosis: Clinical Study. A. Bassi.—p. 78.

Parapneumothoracic Empyema.—Rossi observed several cases of septic parapneumothoracic empyema which opened either spontaneously or as the result of surgical intervention. He believes that either type is best treated by converting the open into a closed empyema by blocking the fistula or the surgical wound and treating the condition by thoracentesis and intrapleural decompression. In spontaneously fistulized empyema the treatment is administered daily, up to the time of closure of the fistula, which as a rule takes place within fifteen or twenty days, after which the frequency and duration of the treatment depend on the general condition of the patient and the state of empyema. It is advisable to give the treatment every other day for two weeks after closure of the fistula, and then every week for two more weeks. In a parapneumothoracic empyema which was opened surgically it is advisable to institute moderate intrapleural aspiration as soon as possible. The proper time for closing the thoracic wound and performing thoracentesis and intrapleural decompression is determined by the general condition of the patient and need for preserving the drainage or the possibility of discontinuing it. It is advisable to institute the treatment as soon as possible. Thoracentesis with the resultant intrapleural decompression exerts as a rule a favorable effect on the extent and nature of empyema, controls toxicosis and

improves the general condition of the patient. The parenchymal pulmonary lesions regress and frequently heal. In some cases complete reexpansion of the lung takes place, requiring phrenicoexeresis or a thoracoplasty.

Klinische Wochenschrift, Berlin

18: 1541-1564 (Dec. 9) 1939. Partial Index

Malignant Hypertension or Malignant Nephrosclerosis? T. Fahr.—p. 1541.
*Antiallergic Action of Insulin. W. Brühl.—p. 1545.
Rapidity and Site of "Nephrotoxin" Fixation in Experimental Glomerular Nephritis. H. Sarre and H. Wirtz.—p. 1548.
Vitamin C Content of Breast Milk Before and After Boiling. Rosemarie Albrecht.—p. 1550.
Active Immunization Against Tetanus. K. E. Vogt.—p. 1553.
Examination of Cloudy Urine. B. Jurukoff.—p. 1555.
Vitamin Content of Domestic Oils. Marie Maxim and G. Bors.—p. 1555.

Antiallergic Action of Insulin.—In an earlier report Brühl called attention to the favorable influence exerted by the "insulin thrust" on allergic skin diseases, such as urticaria, Quincke's edema and eczema. The insulin thrust, or the intravenous injection of 10 units of insulin, produced a prompt subsidence of the acute cutaneous symptoms and an improvement in the allergic condition of the organism, as indicated by the intervals between the attacks. The results obtained in other types of allergy, such as bronchial asthma, mucous colitis and hay fever, convinced the author that it is possible to influence allergic processes with insulin therapy. In order to explain the antiallergic action of the insulin thrust, Brühl made control tests of the blood picture, the blood pressure, the body temperature and the refractometric serum index. The insulin thrust was found to produce leukocytosis, elevation in blood pressure, increase of the refractometric serum index and decrease in the temperature, that is, a picture which is the reverse of Widal's hemoclastic crisis. Since Widal's crisis must be regarded as a reliable criterion of the existence of an allergic process, the antiallergic character of the insulin thrust seems to be established. The disappearance of the eosinophils together with the changes in the blood picture which indicate a tendency toward sympathicotonia provide further evidence of the strongly antiallergic action of the insulin thrust. The employment of Vaughan's method for the determination of the leukopenic index revealed that allergic patients under the influence of the insulin thrust did not respond with the customary leukopenia to their specific allergen. The cessation of this reaction likewise indicates the antiallergic action of the insulin thrust. The author ascribes these biologic effects of the insulin thrust to the reactive production of epinephrine.

Nederlandsch Tijdschrift v. Geneeskunde, Amsterdam

84: 205-280 (Jan. 20) 1940

Influenza Epidemic of February-March 1939 in Garrison of Groningen: Bacteriology. J. Mulder assisted by R. van den Berg and R. van Kollem.—p. 214.
New Guiding Principles for Treatment of Torticollis Spastica (Cerebralis). S. Koster.—p. 225.
*Clinical Experiences with Desoxycorticosterone Acetate in Addison's Disease. G. A. Kreuzwendedich von dem Borne and E. Lopes Cardozo.—p. 231.

Desoxycorticosterone Acetate in Addison's Disease.—The comparatively high price and the lack of uniformity in its preparations are cited by Kreuzwendedich von dem Borne and Lopes Cardozo as disadvantages of the treatment of Addison's disease with adrenal cortex extract. The synthetic preparation desoxycorticosterone acetate was found to be a potent substance. The authors cite several investigators who obtained favorable results with this substance. A detailed report of the history of a woman with Addison's disease treated with various therapeutic measures is presented. With a diet low in potassium and with 10 Gm. of sodium chloride, 0.5 cc. of desoxycorticosterone acetate daily was sufficient to maintain a normal blood pressure and mineral balance. The action of 0.5 cc. of desoxycorticosterone acetate was stronger than that of 10 cc. of adrenal cortex extract. With 2 cc. of desoxycorticosterone acetate daily it was possible to maintain the patient in a normal condition even with a low sodium chloride and high potassium intake. The authors admit that desoxycorticosterone acetate may cause undesirable side effects such as high fever, which in the reported case was accompanied by hypoglycemia. In view of the potent action, overdosage is not without danger, especially with high salt intake.

Acta Chirurgica Scandinavica, Stockholm

83: 185-381 (Dec. 31) 1939. Partial Index

Clinicohistologic Investigation on Hemangioma. K. Boman.—p. 185.
Hernia Uteri Inguinalis in Male Subjects. O. Nilson.—p. 231.
Transurethral Resection for Prostatic Obstruction with Report of 100 Patients Past 75 Years of Age. A. Gundersen.—p. 250.
*Few Observations on Fat Embolism. F. Kolmert.—p. 263.
*Description of a Family with Preaxial Polydactylism. S. Sjöstedt.—p. 269.
Experimental Study of Intestinal Motility in Mechanical Ileus. R. Brandberg.—p. 287.
*Diagnosis and Therapy of Tuberculosis of Epididymis. E. Ljunggren.—p. 307.
Chondrodysplasia (Ollier's Disease) — Multiple Enchondromatosis? M. Dahle.—p. 329.

Fat Embolism.—Kolmert reports three cases of fat embolism, two of which developed in connection with fractures and the third as a result of a urethrographic examination, a fatty substance having been used as a contrast medium. The roentgenograms were similar in all three cases, showing diffuse cloudiness and spotty areas of density over both lungs, which remained a long time after the appearance of the fat emboli. The author states that stimulants, blood letting and the administration of fluid had no effect. In two cases, however, treatment with oxygen proved to be highly beneficial and in one of them it saved the patient's life.

Preaxial Polydactylism. — Sjöstedt reviews the present status of the knowledge on polydactylism, particularly with regard to its hereditary transmission. The heredity has been considered by some as recessive, by others as dominant, and still others regard polydactylism as a mutation. Polydactylism frequently concurs with syndactylism, an anomaly which is likewise hereditary. The concurrence of these two anomalies was observed in a family that was investigated by the author. The anomalies could be followed through five generations. A diagram of the genealogic tree of this family records the unilateral and bilateral occurrence of the polydactylism and syndactylism in the different members of the family. It is of special interest that the polydactylism is preaxial in this family; that is, the first toe is duplicated. The more common form of polydactylism is the postaxial one, in which the supernumerary digit is on the outside of the fifth finger or toe. The author arrives at the conclusion that polydactylism in this family was inherited dominantly.

Tuberculosis of Epididymis. — Ljunggren discusses the diagnosis and treatment of tuberculosis of the epididymis on the basis of sixty-eight cases in which operation was performed at Key's surgical clinic in Stockholm during the period from 1927 to 1937. In 60 per cent of the cases it was possible to establish tuberculous infection of the glands of the lungs or the hilus; however, in only seventeen cases (25 per cent) did active pulmonary tuberculosis exist up to the time of the operation. In 50 per cent of the cases renal tuberculosis existed previously or simultaneously or it developed later. This high percentage indicates that it is necessary to resort to urologic examination in all cases, so as to detect possible renal tuberculosis. Urethrography is valuable in the diagnosis of tuberculosis of the prostate. In the author's material it was employed in twenty-eight cases. Cavities filled with contrast medium were observed in fourteen cases, even in some in which nothing abnormal could be found on rectal examination. Roentgenologic examination of the epididymis is of slight diagnostic value. Calcium shadows characteristic of tuberculosis could be found in only one case. Ten cases were bilateral before the beginning of treatment. In the other fifty-eight, which were unilateral, epididymectomy was performed thirty-nine times. There were fourteen recurrences. Semicastration was carried out nineteen times, and in these cases recurrence of tuberculosis in the other epididymis occurred thirteen times. In fifty-five cases it was possible to ascertain the fate of the main testicle after epididymectomy. It was intact in forty cases, in ten cases it had been secondarily extirpated and in five cases it had undergone extensive atrophy. Of the patients operated on, 31 per cent died in the course of the first five years from some tuberculous disease (pulmonary, renal or miliary tuberculosis). It is of importance, therefore, that patients who have had an operation for tuberculosis of the epididymis should be kept under continuous observation and the operation followed by climatic and dietetic after-treatment.